

APPENDIX G - DATA QUALITY INDICATORS
[To be reviewed and reassessed by ad hoc workgroup]

DATA QUALITY INDICATORS

1.0 INTRODUCTION

Data Quality Indicators (DQIs) are statements of data quality commonly used to express measurement uncertainty as precision, accuracy, representativeness, completeness, and comparability. DQIs in IADN are based on what is achievable through the current state of the art and serve as specifications of the quality of the data, however that quality determination is made.

The IADN measurement data consists of determinations of the concentration of various toxic chemicals in both air and precipitation. The primary use of the measured concentration data will be to determine the deposition of the toxic chemicals to the Great Lakes in terms of seasonal and annual averages. Deposition estimates are to be derived from the concentration measurements through the use of certain loading equations (see Section 1.3). These loading equations make use of additional parameters and constants (such as deposition velocity and Henry's Law constant) that have additional uncertainties associated with them.

Participants of the 1992 workshop that reviewed initial drafts of the first QAPP agreed that for IADN to meet its program goals, the deposition of certain chemicals would need to be determined with an uncertainty of roughly 30 percent. They also agreed that the current state of knowledge and measurement art is such that it is not possible to determine the deposition of many of these chemicals to better than within a factor of two. These same participants also agreed that determining the concentration of specific compounds is subject to an uncertainty of roughly 50 percent for many of the chemicals of interest. Most of the uncertainty in deposition estimates arises from uncertainties in the terms and parameters used in the loading equations.

2.0 ESTIMATES OF UNCERTAINTY (DQI'S)

Data quality indicators are given in terms of accuracy, precision, detection limits, representativeness, and comparability. Measures used by the various agencies to represent these DQIs are summarized in Table G-18. Ideally, these measures should be uniform among the participating agencies, however, there are numerous differences. An ad hoc working group was formed by the Steering Committee at their May, 2001 Data Quality Workshop in Windsor. The

primary role of this working group will be to review and reassess the measures used to derive DQIs, and to advise the Steering Committee on preferred measures and definitions.

2.1 Calculation Of Accuracy

Accuracy is the degree of agreement between a measurement (or the average of measurements of the same quantity) and an accepted reference or true value. For most of the measurements taken for IADN, there are no known true values or even reference methods for determining the quantity of interest. Thus, overall accuracy is often unknown and unknowable. However, certain portions of a measurement process may have their accuracy assessed. For example, laboratory accuracy may be characterized through the use of laboratory surrogate spikes and laboratory matrix spikes. Usually, laboratory accuracy is reported as percent recovery. For some measurements, such as TSP and PM-10 where there is no standard atmospheric aerosol, determinations of accuracy may be limited to the accuracy of the flow rate measurement or volume of air sampled. For Tables G-4, G-9, and G-14, values are based on a mean of laboratory spike recovery data (Equations 3-2 and 3-5), with $n \geq 10$.

2.1.1 Percent Difference from Standard Reference Material (SRM)

The percent difference for a measured value from the certified reference value is given by

$$\%Diff_{SRM} = 100 \times \left(\frac{X_m - X_{SRM}}{X_{SRM}} \right) \quad (3-1)$$

where $\%Diff_{SRM}$ = percent difference
 X_m = measured value
 X_{SRM} = certified SRM value

2.1.2 Percent Recovery for Matrix Spikes

$$\%R = 100 \times \left[\frac{C_s - C_u}{C_{sa}} \right] \quad (3-2)$$

where %R = percent recovery
 C_s = measured concentration in spiked aliquot
 C_u = measured concentration in unspiked aliquot
 C_{sa} = actual concentration of spike added

2.2 Calculation Of Precision

The term precision is used as a measure of the mutual agreement among individual measurements of the same property under prescribed similar conditions. Overall precision usually refers to the degree of agreement for the entire sampling, operational, and analysis system. It is derived from multiple measurements from collocated sampling instruments. Analytical precision refers to the precision of the analysis portion of the measurement process. It is usually determined from analyses of laboratory surrogate spikes and laboratory matrix spikes. For Tables G-5, G-10, and G-15, agencies provide values based on the relative standard deviation (RSD) of laboratory matrix spikes (Equations 3-2, 3-4, 3-5, and 3-3).

2.2.1 Replicate Measurements: Relative Standard Deviation (RSD) or Coefficient of Variation (CV)

$$CV = RSD = \left(\frac{S}{\bar{C}} \right) \times 100 \quad (3-3)$$

where CV = coefficient of variation
 RSD = relative standard deviation
 S = standard deviation
 \bar{C} = mean value of replicate observed values

and the Standard Deviation, S, for an individual sample set is defined as:

$$S = \left[\frac{1}{n-1} \sum_{i=1}^n (C_i - \bar{C})^2 \right]^{1/2} \quad (3-4)$$

where C_i = observed value of the ith replicate
 \bar{C} = mean of replicate observed values
 n = number of replicates

and the mean, \bar{C} , is defined as:

$$\bar{C} = \frac{I}{n} \sum_{i=1}^n C_i \quad (3-5)$$

2.2.2 Geometric Distributions

When the data set has a log-normal distribution, Equations 3-4 and 3-5 are not

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2) / 2} \times 100$$

$$\bar{X}_g = \left[\prod_{i=1}^n x_i \right]^{\frac{1}{n}}$$

appropriate, and the geometric mean, \bar{X}_g , and geometric standard deviation, S_g are used instead. These statistics are referenced in Appendix J.

$$\bar{X}_g = \text{antilog} \left[\frac{\sum_{i=1}^n \log x_i}{n} \right] \quad (3-6a)$$

OR

$$S_g = \text{antilog} \left[\sqrt{\frac{\sum_{i=1}^n (\log X_i - \bar{\log x})^2}{n-1}} \right]^{1/2} \quad (3-6b)$$

$$S_g = \text{antilog} \left[\sqrt{\frac{\sum_{i=1}^n (\log X_i - \bar{\log x})^2}{n-1}} \right]^{1/2} \quad (3-7)$$

2.3 Detectability

The IADN program monitors chemicals at trace concentrations in environmental samples often taxing the limit of sensitivity of the instruments and methods used. IADN uses a number of expressions of detectability to define the lowest chemical concentrations measurable in the

program and the frequency at which various chemicals are found in IADN samples.

Per cent detectability is the percentage of valid samples taken successfully through the analytical process that contain a measurable amount of analyte above detection limits. Per cent detectability can be used to make management decisions on future monitoring for individual chemicals.

2.3.1 Limit Of Detection

The limit of detection for an analytical method is the minimum level or concentration of the analyte which can be observed by the instrument and distinguished from instrument noise with a specified degree of probability. Several different terms may be used to describe how the detection limits are derived. The following terms and formulas are commonly used by the groups and agencies participating in IADN.

2.3.2 Instrument Detection Limit (IDL)

The instrument detection limit (IDL) is the lowest concentration of analyte that an analytical instrument can detect and which is statistically different from the response obtained from the background instrumental noise. Two methods for determining IDL are used in IADN.

The IDL can be established by adding the analyte in reagent blank water or solvent to give a concentration within a few times the estimated IDL and calculating the standard deviation, S , for seven or more replicate measurements. The 95% or 99% confidence level is then used to calculate the IDL according to:

$$\text{IDL} = t_{(n-1, 1-\alpha)} \times S \quad (3-8)$$

where $t_{(n-1, 1-\alpha)}$ is the value for a one-sided Students' t-distribution for $n-1$ degrees of freedom and $1-\alpha$ is either 0.95 or 0.99. The IDL indicates the absolute sensitivity of the analytical technique or instrument.

This IDL can also be estimated by zooming in on a section of instrument output in a region with no analyte, for example part of a chromatogram where there are no peaks, and finding the peak height of baseline noise. Two times this baseline noise can be used to estimate IDL.

2.3.3 Method Detection Limit (MDL)

The method detection limit (MDL) is the lowest concentration of analyte in distilled water or appropriate solvent that a method can detect reliably and is statistically different from a blank carried through the complete method, including extraction and pretreatment of the sample. The MDL is specified based on replicate analyses of seven or more measurements with a specified confidence level.

$$MDL = t_{(n-1, 1-\alpha)} \times S \quad (3-9)$$

where $t_{(n-1, 1-\alpha)}$ is the value for a one-sided Students' t-distribution for $n-1$ degrees of freedom and $1-\alpha$ is either 0.95 or 0.99. The IDL indicates the absolute sensitivity of the analytical technique or instrument. If the MDL is experimentally evaluated for each matrix using the analysis of samples or spiked samples, then it is called a matrix-specific Method Detection Limit.

2.3.4 Limit of Detection (LOD)

The limit of detection (LOD) is defined for the case where repeated analyses of field blanks show a positive response for the analyte. The LOD is then given by

$$LOD = \bar{C}_b + t_{(n-1, 1-\alpha)} \times S \quad (3-10)$$

where \bar{C}_b is the average level for the field blanks, S is the standard deviation of the replicate determinations (seven or more), and $t_{(n-1, 1-\alpha)}$ is the Students' t-distribution for $n-1$ degrees of freedom and $1-\alpha$ is chosen to be 0.95 or 0.99. For the IADN, $t_{(n-1, 1-\alpha)}$ is assumed to be 3. Thus

$$LOD (\text{IADN}) = \bar{C}_b + (3 \times S) \quad (3-11)$$

The LOD will be the larger of Equation 3-9 or 3-11.

2.3.5 IADN Limit of Detection

The IADN limit of detection was defined in the previous section (the larger of Equation 3-9 or 3-11). However, laboratories differ in how they routinely handle and report values that are at or below certain detection limits. Thus a data reduction protocol has been developed to standardize the reporting of certain data. This protocol is given in Appendix J. For Tables G-4, G-8, and G-12, agencies must specify which equation was used.

2.4 Representativeness

Representativeness is to be assessed qualitatively by adherence to IADN siting criteria as

described in Appendix C.

2.5 Comparability

Very few IADN measurements have standard or reference methods. Comparability is to be assessed through laboratory intercomparisons, use of intercomparison monitoring sites, and comparison with other monitoring and analysis methods. Comparability is also to be enhanced by the use of the same reporting units and standard conditions.

2.6 Completeness

Completeness is defined as the percentage of valid samples collected and analyzed compared to the total expected under typical operating conditions. Valid samples include those for compounds for which the concentration may be determined to be below detection limits. Overall completeness is the product of sampling and analysis completeness. At the January 2000 IADN workshop, completeness goals for concentration measurements of 75% overall (yearly) and 66% overall (seasonal) per site were agreed upon by the participants. Completeness goals of 95% (yearly) and 90% (seasonally) for field and meteorological measurements were also established.

3.0 AGENCY DQI'S

The following Tables summarize the individual agency DQIs, as well as the IADN working recommendations:

- G1 - G4: air organics measurements
- G5 - G8: precipitation organics measurements
- G9 - G12: trace metals measurements in air and precipitation
- G13 - G15: field and meteorological measurements
- G16: completeness goals for all media and types of measurement
- G17: final working recommendations for DQIs for all types of measurements
- G18: summary of measures used to derive DQIs

Table G-1. Analytical recoveries for air organics concentration measurements^a

TABLE G-1. ANALYTICAL RECOVERIES FOR AIR ORGANICS CONCENTRATION MEASUREMENTS ^A								
Parameter	CAS Number	Working Objective ^b	OME ^c	MSC			IU ^f	
				Matrix Spikes ^d		Cleanup Spikes ^e		Matrix Spike
				PUF	GFF	PUF	GFF	XAD-2 QFF
Air Organics		50-130%						
PCBs		50-130%	n=12					n=46 n=18
Total PCBs								90.88% 88.45%
Congener # PCB 4/10	13029-08-8/33146-45-1							52.87% 51.07%
Congener # PCB 5/8	16605-91-7/34883-43-7							82.92% 79.34%
Congener # PCB 6	25569-80-6							83.12% 78.91%
Congener # PCB 7/9	33284-50-3/34883-39-1							80.67% 74.38%
Congener # PCB 8	34883-43-7		88.2%	82.7%	NP	110.1%	NP	
Congener # PCB 12	2974-92-7							64.86% 58.17%
Congener # PCB 13	2974-90-5							65.76% 63.53%
Congener # PCB 16	38444-78-9							71.16% 72.96%
Congener # PCB 17/15	37680-66-3/2050-68-2							86.23% 81.86%
Congener # PCB 18	37680-65-2			85.8%	NP	109.1%	NP	86.75% 83.82%
Congener # PCB 19	38444-73-4							62.68% 62.08%
Congener # PCB 21	55702-46-0		98.3%					
Congener # PCB 22	38444-85-8							89.45% 87.19%
Congener # PCB 24	55702-45-9							76.03% 77.70%
Congener # PCB 25	55712-37-3							89.26% 85.19%
Congener # PCB 26	38444-81-4							88.52% 86.69%
Congener # PCB 27	38444-76-7							84.65% 80.82%
Congener # PCB 28	7012-37-5							92.27% 89.00%
Congener # PCB 29	15862-07-4							91.25% 79.33%
Congener # PCB 31	16606-02-3							90.36% 87.51%
Congener # PCB 32	38444-77-8							87.02% 84.06%
Congener # PCB 33	38444-86-9							90.93% 87.76%
Congener # PCB 37	38444-90-5							95.03% 97.54%
Congener # PCB 40	38444-93-8							79.40% 80.76%
Congener # PCB 41/71	52663-59-9/41464-46-4							90.49% 87.66%
Congener # PCB 42	36559-22-5							90.96% 89.84%
Congener # PCB 43	70362-46-8							88.75% 83.03%
Congener # PCB 44	41464-29-5							91.14% 106.26%
Congener # PCB 45	70362-45-7							79.30% 77.83%
Congener # PCB 46	41464-47-5							79.13% 78.08%
Congener # PCB 47	2437-79-8							91.36% 88.22%
Congener # PCB 48	70362-47-9							90.91% 86.42%
Congener # PCB 49	41464-40-8		90.7%	NP	108.4%	NP		92.04% 89.37%
Congener # PCB 51	68194-04-7							87.57% 80.63%
Congener # PCB 52	35693-99-3							92.23% 88.97%
Congener # PCB 53	41464-41-9							86.80% 83.02%

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Parameter	CAS Number	Working Objective ^b	OME ^c	MSC				IU ^f	
				Matrix Spikes ^d		Cleanup Spikes ^e		Matrix Spike	
				PUF	GFF	PUF	GFF	XAD-2	QFF
Congener # PCB 56/60	61646-43-1/33025-41-4							94.45%	91.33%
Congener # PCB 63	74472-34-7							84.81%	78.71%
Congener # PCB 64	52663-58-8							91.80%	89.83%
Congener # PCB 66	32598-10-0		84.8%					94.88%	93.19%
Congener # PCB 70/76	32598-11-1/70362-48-0							93.79%	93.08%
Congener # PCB 74	32690-93-0							94.39%	93.18%
Congener # PCB 77	32598-13-3							96.72%	100.52%
Congener # PCB 81	70362-50-4							98.89%	92.84%
Congener # PCB 82	52663-62-4							88.97%	86.42%
Congener # PCB 83	60145-20-2							97.64%	83.53%
Congener # PCB 84/92	52663-60-2/52663-61-3							93.14%	91.75%
Congener # PCB 85	65510-45-4							95.26%	94.37%
Congener # PCB 87	38380-02-8			NA	NP	NA	NP	95.51%	93.89%
Congener # PCB 89	73757-57-2							86.98%	85.56%
Congener # PCB 91	68194-05-8							90.38%	87.44%
Congener # PCB 95	38379-99-6							93.21%	88.80%
Congener # PCB 97	41464-51-1							94.37%	90.19%
Congener # PCB 99	38380-01-7							112.83%	115.10%
Congener # PCB 100	39485-83-1							104.44%	97.69%
Congener # PCB 101	37680-73-2							95.19%	93.96%
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1							92.825	91.04%
Congener # PCB 107	70424-68-9							97.89%	99.47%
Congener # PCB 110	38380-03-9		84.4%					96.22%	93.51%
Congener # PCB 114/131	74472-37-0/61798-70-7							103.22%	108.44%
Congener # PCB 118	31508-00-6							93.14%	94.78%
Congener # PCB 119	56558-17-9							102.62%	110.12%
Congener # PCB 123/149	65510-44-3/38380-04-0							93.53%	92.03%
Congener # PCB 128	38380-07-3							91.13%	84.89%
Congener # PCB 129	55215-18-4							100.70%	79.14%
Congener # PCB 130	52663-66-8							96.65%	80.03%
Congener # PCB 134	52704-70-8							90.76%	87.80%
Congener # PCB 135/144	52744-13-5/68194-14-9							94.81%	93.72%
Congener # PCB 136	38411-22-2		81.4%					92.37%	93.09%
Congener # PCB 137/176	35694-06-5/52663-65-7							92.73%	89.11%
Congener # PCB 138/163	35065-28-2							96.08%	100.09%
Congener # PCB 141	52712-06-4							93.53%	91.46%
Congener # PCB 146	51908-16-8							95.88%	92.95%

TABLE G-1. ANALYTICAL RECOVERIES FOR AIR ORGANICS CONCENTRATION MEASUREMENTS^A

Parameter	CAS Number	Working Objective ^b	OME ^c	MSC				IU ^f	
				Matrix Spikes ^d		Cleanup Spikes ^e		Matrix Spike	
				PUF	GFF	PUF	GFF	XAD-2	QFF
Congener # PCB 151	52663-63-5							92.85%	90.56%
Congener # PCB 156	38380-08-4							91.71%	88.48%
Congener # PCB 157/200	69782-90-7/52663-73-7							95.53%	92.74%
Congener # PCB 158	74472-42-7			95.3%	NP	106.6%	NP	92.88%	81.84%
Congener # PCB 167	52663-72-6							117.00%	104.63%
Congener # PCB 170/190	35065-30-6/41411-64-7							96.29%	97.91%
Congener # PCB 171/202	52663-71-5/2136-99-4							94.77%	93.77%
Congener # PCB 172	52663-74-8							95.69%	96.55%
Congener # PCB 173	68194-16-1							99.32%	86.65%
Congener # PCB 174	38411-25-5							93.55%	93.02%
Congener # PCB 175	40186-70-7							93.55%	86.19%
Congener # PCB 177	52663-70-4							94.21%	93.73%
Congener # PCB 178	52663-67-9							94.13%	92.27%
Congener # PCB 180	35065-29-3							95.06%	93.39%
Congener # PCB 182/187	60145-23-5/52663-68-0							94.38%	93.24%
Congener # PCB 183	52663-69-1							94.09%	92.76%
Congener # PCB 185	52712-05-7							93.80%	92.98%
Congener # PCB 189	39635-31-9							105.67%	99.78%
Congener # PCB 191	74472-50-7		74.4%	NS	NP	NS	NP	90.09%	84.97%
Congener # PCB 193	69782-91-8							90.90%	85.57%
Congener # PCB 194	35694-08-7							96.03%	98.24%
Congener # PCB 195/208	52663-78-2/52663-77-1							95.00%	96.08%
Congener # PCB 196	42740-50-1							97.94%	90.74%
Congener # PCB 197	33091-17-7							92.14%	89.13%
Congener # PCB 198	68194-17-2		93.3%	NP	100.9%	NP	95.50%	99.70%	
Congener # PCB 199	52663-73-7							93.84%	91.91%
Congener # PCB 201	52663-75-9							95.73%	96.11%
Congener # PCB 203	52663-76-0							93.60%	96.30%
Congener # PCB 205	4472-53-0		79.8%					97.21%	92.05%
Congener # PCB 206	40186-72-9			104.3%	NP	111.6%	NP	95.47%	96.67%
Congener # PCB 207	52663-79-3			102.35	NP	108.6%	NP	94.55%	95.23%
Congener # PCB 209	2051-24-3							84.94%	73.16%
Pesticides		75-120%/50-130%	n=12					n=31	n=20
α -HCH	319-84-6		87.0%	62.2%	NP	87.5%	NP	78.53%	78%
γ -HCH	58-89-9		102.8%	73.1%	NP	94.1%	NP	86.87%	81.8%
DDT (+ metabolites)			n/a						
p,p'-DDT	50-29-3		32.4%	105.9%	NP	118.3%	NP	79.45%	83.17%

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Parameter	CAS Number	Working Objective ^b	OME ^c	MSC				IU ^f	
				Matrix Spikes ^d		Cleanup Spikes ^e		Matrix Spike	
				PUF	GFF	PUF	GFF	XAD-2	QFF
o,p'-DDD	53-19-0		n/a	n/a	n/a	n/a	n/a	n/a	n/a
p,p'-DDD	72-54-8		53.7%	96.3%	NP	107.4%	NP	86.04%	81.86%
p,p'-DDE	72-55-9		39.6%	n/a	n/a	n/a	n/a	90.29%	87.71%
chlordanne	57-74-9								
α -chlordanne	5130-71-9		-	80.3%	NP	94.2%	NP	91.7%	88.09%
γ -chlordanne	5103-74-2		-	85.8%	NP	99.2%	NP	86.61%	84.84%
nonachlor	3734-49-4								
trans-nonachlor	39765-80-5		-	87.4%	NP	101.5%	NP	73.39%	72.38%
endrin	70-20-8		-	97.6%	NP	109.6%	NP	n/a	n/a
HCB	118-74-1		76.2%	71.6%	NP	101.7%	NP	74.38%	71.40%
heptachlor epoxide	1024-57-3		77.5%	79.5%	NP	92.4%	NP	n/a	n/a
methoxychlor	72-43-5		-	123.2%	NP	133.6%	NP	n/a	n/a
dieldrin	60-57-1		103.1%	90.3%	NP	103.3%	NP	88.97%	86.01%
PAHs		75-120%/50-130%	n=30					n=27	n=18
benzo[a]pyrene	50-32-8		82%	68.2%	94.9%	88.5%	93.8%	81.98%	63.66%
naphthalene	91-20-3		n/a	n/a	n/a	n/a	n/a		
acenaphthylene	208-96-8		n/a	41.8%	76.1%	67.0%	73.0%	24.77%	29.45%
acenaphthene	83-32-9		n/a	36.4%	73.4%	64.2%	75.4%	25.18%	22.25%
fluorene	86-73-7		n/a	57.6%	68.8%	74.6%	79.5%	65.63%	60.20%
phenanthrene	85-01-8		138%	100.6%	95.3%	76.9%	79.4%	68.86%	65.66%
retene	483-65-8		n/a	NP	77.3%	NP	95.5%		
anthracene	120-12-7		n/a	51.2%	65.3%	72.4%	73.5%	63.10%	55.41%
fluoranthene	206-44-0		105%	69.9%	68.8%	71.5%	71.4%	90.5%	82.71%
pyrene	129-00-0			98%	88.0%	84.1%	80.1%	72.9%	81.69%
triphenylene	217-59-4		n/a	90.1%	86.3%	84.1%	80.4%	n/a	n/a
benzo(g,h,i)fluoranthene	203-12-3		n/a	74.5%	88.0%	83.9%	85.9%	n/a	n/a
benzo[a]anthracene	56-55-3			90%	86.8%	77.0%	83.3%	78.4%	84.09%
chrysene	218-01-9		95%	93.3%	81.1%	89.4%	85.4%	86.01%	88.08%
benzo[e]pyrene	192-97-2		n/a	108.9%	84.4%	96.6%	91.9%	83.51%	78.59%
benzo[b]fluoranthene	205-99-2			97%	79.5%	92.4%	95.8%	95.6%	94.74%
dibenzo[a,c]anthracene	215-58-7		n/a	74.1%	88.7%	95.4%	90.4%	n/a	n/a
benzo[k]fluoranthene	207-08-9			94%	70.3%	76.1%	59.9%	62.0%	91.71%
dibenzo[a,h]anthracene	53-70-3		97%	83.4%	82.7%	97.0%	93.4%	95.61%	87.33%
benzo[g,h,i]perylene	191-24-2			96%	83.8%	98.7%	106.9%	105.4%	94.90%
indeno[1,2,3-c,d]pyrene	193-39-5			97%	97.4%	98.1%	101.1%	96.0%	90.00%
anthanthrene	191-26-4		n/a	51.6%	78.0%	54.4%	66.6%	93.10%	55.41%

^a Analytical recovery, a measure of analytical accuracy, is defined in Section 3.1 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Established during January 2000 Workshop.

^c Between-run mean recovery, based on equation 3-2; for PCBs/OCs data collected 1995; for PAHs data collected July/96-Mar/97.

^d Between-run mean recovery, based on equation 3-2, for spikes (n>7) onto Polyurethane foam (PUF) and glass fibre filters (GFF) conducted in parallel with analyses covering a full sampling year at PPT site (1994 for PCBs/OCs on PUF; 1994 for PAHs (except retene) on GFF; 1995 for retene on GFF; 1992 for PAHs on PUF).

^e Between-run mean recovery, based on equation 3-2, for spikes onto cleanup media (Florisil for PCBs/OCs; Silica & Alumina-N Sep-Paks for PAHs), conducted in parallel with analyses covering a full sampling year at PPT site (1994 for PCBs/OCs on PUF; 1994 for PAHs (except retene) on GFF; 1995 for retene on GFF; 1992 for PAHs on PUF).

^f Between-run mean recovery, based on equation 3-2, spiked onto clean XAD-2 and quartz fiber filter (QFF). N values provided in table.

n/a Not applicable.

NA Data not available) due to co-elutions with other spike compounds on DB5 GC/ECD method)

NP Spike not performed for this matrix.

NS This species not included in spiking mixture.

Table G-2. Analytical precision for air organics concentration measurements^a

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	MSC				IU ^F	
				MATRIX SPIKE ^D		CLEANUP SPIKE ^E		MATRIX SPIKE	
				PUF	GFF	PUF	GFF	XAD	QFF
AIR ORGANICS		±50-100%							
PCBS		±50-100%	N=12					N=46	N=18
TOTAL PCBS								14.79%	6.72%
Congener # PCB 4/10	13029-08-8/ 33146-45-1							45.26%	34.83%
Congener # PCB 5/8	16605-91-7/ 34883-43-7							14.64%	12.135
Congener # PCB 6	25569-80-6							14.76%	10.83%
Congener # PCB 7/9	33284-50-3/ 34883-39-1							17.61%	14.96%
Congener # PCB 8	34883-43-7		26.0%	4.3%	NP	7.0%	NP		
Congener # PCB 12	2974-92-7							39.83%	42.11%
Congener # PCB 13	2974-90-5							43.45%	29.18%
Congener # PCB 16	38444-78-9							27.57%	29.18%
Congener # PCB 17/15	37680-66-3/ 2050-68-2							13.69%	19.71%
Congener # PCB 18	37680-65-2			4.2%	NP	6.9%	NP	13.32%	10.31%
Congener # PCB 19	38444-73-4							37.98%	23.85%
Congener # PCB 21	55702-46-0		16.3%						
Congener # PCB 22	38444-85-8							13.26%	9.16%
Congener # PCB 24	55702-45-9							31.53%	18.88%
Congener # PCB 25	55712-37-3							15.58%	10.35%
Congener # PCB 26	38444-81-4							20.24%	8.98%
Congener # PCB 27	38444-76-7							15.29%	13.98%
Congener # PCB 28	7012-37-5							16.69%	12.58%
Congener # PCB 29	15862-07-4							28.91%	27.91%
Congener # PCB 31	16606-02-3							16.56%	12.19%
Congener # PCB 32	38444-77-8							12.95%	9.79%
Congener # PCB 33	38444-86-9							12.83%	10.46%
Congener # PCB 37	38444-90-5							15.96%	12.59%
Congener # PCB 40	38444-93-8							20.67%	13.39%
Congener # PCB 41/71	52663-59-9/ 41464-46-4							13.77%	10.21%
Congener # PCB 42	36559-22-5							13.775	8.1%
Congener # PCB 43	70362-46-8							14.21%	14.01%
Congener # PCB 44	41646-29-5							13.13%	45.49%
Congener # PCB 45	70362-45-7							22.92%	19.98%
Congener # PCB 46	41464-47-5							20.74%	14.79%
Congener # PCB 47	2437-79-8							14.945	8.96%
Congener # PCB 48	70362-47-9							13.11%	11.515
Congener # PCB 49	41464-40-8			4.8%	NP	6.4%	NP	12.58%	8.945

TABLE G-2. ANALYTICAL PRECISION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	MSC				IU ^F	
				MATRIX SPIKE ^D		CLEANUP SPIKE ^E		MATRIX SPIKE	
				PUF	GFF	PUF	GFF	XAD	QFF
Congener # PCB 51	68194-04-7							15.20%	19.73%
Congener # PCB 52	35693-99-3							12.31%	8.33%
Congener # PCB 53	41464-41-9							14.75%	12.26%
Congener # PCB 56/60	61646-43-1/ 33025-41-4							13.76%	8.86%
Congener # PCB 63	74472-34-7							37.21%	35.28%
Congener # PCB 64	52663-58-8							12.24%	7.30%
Congener # PCB 66	32598-10-0		16.8%					13.39%	7.25%
Congener # PCB 70/76	32598-11-1/ 70362-48-0							13.57%	7.35%
Congener # PCB 74	32690-93-0							13.47%	7.66%
Congener # PCB 77	32598-13-3							19.43%	17.19%
Congener # PCB 81	70362-50-4							25.62%	15.77%
Congener # PCB 82	52663-62-4							16.20%	9.31%
Congener # PCB 83	60145-20-2							17.40%	23.12%
Congener # PCB 84/92	52663-60-2/ 52663-61-3							13.88%	8.21%
Congener # PCB 85	65510-45-4							12.77%	7.94%
Congener # PCB 87	38380-02-8			NA	NP	NA	NP	14.19%	8.26%
Congener # PCB 89	73757-57-2							21.75%	27.02%
Congener # PCB 91	68194-05-8							15.93%	12.52%
Congener # PCB 95	38379-99-6							15.58%	10.49%
Congener # PCB 97	41464-51-1							15.13%	13.67%
Congener # PCB 99	38380-01-7							47.38%	28.04%
Congener # PCB 100	39485-83-1							30.34%	20.17%
Congener # PCB 101	37680-73-2							14.46%	8.84%
CONGENER # PCB 105/132/153	32598-14-4/ 38380-05-1/ 35065-27-1							16.27%	11.73%
Congener # PCB 107	70424-68-9							31.23%	31.57%
Congener # PCB 110	38380-03-9		16.5%					14.27%	8.05%
Congener # PCB 114/131	74472-37-0/ 61798-70-7							29.97%	28.46%
Congener # PCB 118	31508-00-6							13.09%	10.64%
Congener # PCB 119	56558-17-9							43.75%	42.88%
Congener # PCB 123/149	65510-44-3/ 38380-04-0							12.80%	8.08%
Congener # PCB 128	38380-07-3							15.40%	22.32%
Congener # PCB 129	55215-18-4							40.33%	41.20%
Congener # PCB 130	52663-66-8							27.83%	31.25%
Congener # PCB 134	52704-70-8							23.22%	42.60%
Congener # PCB 135/144	52744-13-5/ 68194-14-9							15.64%	27.01%
Congener # PCB 136	38411-22-2		16.2%					15.53%	10.16%

TABLE G-2. ANALYTICAL PRECISION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	MSC				IU ^F	
				MATRIX SPIKE ^D		CLEANUP SPIKE ^E		MATRIX SPIKE	
				PUF	GFF	PUF	GFF	XAD	QFF
Congener # PCB 137/176	35694-06-5/ 52663-65-7							13.00%	9.08%
Congener # PCB 138/163	35065-28-2							19.04%	26.93%
Congener # PCB 141	52712-06-4							12.37%	6.56%
Congener # PCB 146	51908-16-8							13.64%	9.88%
Congener # PCB 151	52663-63-5							12.65%	6.30%
Congener # PCB 156	38380-08-4							20.19%	12.52%
Congener # PCB 157/200	69782-90-7/ 52663-73-7							15.65%	7.41%
Congener # PCB 158	74472-42-7			6.6%	NP	7.9%	NP	17.15%	14.44%
Congener # PCB 167	52663-72-6							45.44%	36.52%
Congener # PCB 170/190	35065-30-6/ 41411-64-7							14.71%	15.41%
Congener # PCB 171/202	52663-71-5/ 2136-99-4							12.89%	5.41%
Congener # PCB 172	52663-74-8							13.02%	7.56%
Congener # PCB 173	68194-16-1							39.28%	36.62%
Congener # PCB 174	38411-25-5							14.28%	5.78%
Congener # PCB 175	40186-70-7							14.98%	17.32%
Congener # PCB 177	52663-70-4							12.92%	5.57%
Congener # PCB 178	52663-67-9							12.78%	6.34%
Congener # PCB 180	35065-29-3							12.72%	9.44%
Congener # PCB 182/187	60145-23-5/ 52663-68-0							12.50%	5.93%
Congener # PCB 183	52663-69-1							12.43%	5.785
Congener # PCB 185	52712-05-7							12.51%	6.61%
Congener # PCB 189	39635-31-9							26.95%	24.94%
Congener # PCB 191	74472-50-7		13.9%	NS	NP	NS	NP	22.00%	18.83%
Congener # PCB 193	69782-91-8							15.86%	14.52%
Congener # PCB 194	35694-08-7							13.41%	11.43%
Congener # PCB 195/208	52663-78-2/ 52663-77-1							13.37%	8.68%
Congener # PCB 196	42740-50-1							20.25%	14.08%
Congener # PCB 197	33091-17-7							15.95%	13.13%
Congener # PCB 198	68194-17-2			14.2%	NP	9.7%	NP	26.64%	38.37%
Congener # PCB 199	52663-73-7							15.61%	8.05%
Congener # PCB 201	52663-75-9							13.33%	7.99%
Congener # PCB 203	52663-76-0							12.32%	8.07%
Congener # PCB 205	4472-53-0		18.1%					31.09%	21.53%
Congener # PCB 206	40186-72-9			6.1%	NP	8.5%	NP	14.44%	8.93%
Congener # PCB 207	52663-79-3							14.56%	11.13%
Congener # PCB 209	2051-24-3			6.3%	NP	8.7%	NP	40.38%	55.17%
PESTICIDES		±50-100%	N=12					N=31	N=20

TABLE G-2. ANALYTICAL PRECISION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	MSC				IU ^F	
				MATRIX SPIKE ^D		CLEANUP SPIKE ^E		MATRIX SPIKE	
				PUF	GFF	PUF	GFF	XAD	QFF
α -HCH	319-84-6		16.3%	7.5%	NP	7.2%	NP	11.13%	12.64%
γ -HCH	58-89-9		49.9%	5.4%	NP	4.9%	NP	15.29%	10.43%
DDT (+ metabolites)			-						
P,P'-DDT	50-29-3		68.1%	5.1%	NP	4.6%	NP	35.04%	38.97%
O,P'-DDD	53-19-0		-	NA	NP	NA	NP		
P,P'-DDD	72-54-8		48.8%	5.6%	NP	4.2%	NP	13.00%	6.77%
P,P'-DDE	72-55-9		17.1%	NA	NP	NA	NP	13.45%	12.36%
chlordanne	57-74-9								
α -chlordanne	5103-71-9		-	6.3%	NP	3.9%	NP	11.93%	4.59%
γ -chlordanne	5103-74-2		-	4.6%	NP	3.4%	NP	11.27%	5.19%
nonachlor	3734-49-4								
trans-nonachlor	39765-80-5		-	4.9%	NP	5.1%	NP	23.00%	18.12%
endrin	70-20-8		-	13.0%	NP	10.5%	NP		
HCB	118-74-1		18.9%	6.9%	NP	7.5%	NP	13.52%	10.87%
heptachlor epoxide	1024-57-3		19.0%	12.0%	NP	6.5%	NP		
methoxychlor	72-43-5		-	8.0%	NP	6.9%	NP		
dieldrin	60-57-1		47.2%	10.1%	NP	8.0%	NP	10.86%	5.20%
PAHS		\pm 50-100%	N=30					N=27	N=18
benzo[a]pyrene	50-32-8		19%	23.7%	19.2%	10.2%	10.5%	35.38%	23.45%
naphthalene	91-20-3		N/A	N/A	N/A	NA	NA		
acenaphthylene	208-96-8		N/A	20.5%	29.8%	16.9%	8.2%	41.59%	41.47%
acenaphthene	83-32-9		N/A	62.2%	17.8%	35.5%	12.3%	91.15%	61.85%
fluorene	86-73-7		N/A	22.0%	6.6%	21.9%	5.5%	26.64%	17.66%
phenanthrene	85-01-8		55%	25.2%	18.6%	22.9%	9.4%	25.25%	19.68%
retene	483-65-8		N/A	NP	13.7%	NP	0.7%		
anthracene	120-12-7		N/A	15.7%	15.3%	20.3%	7.5%	32.76%	21.69%
fluoranthene	206-44-0		29%	13.7%	17.8%	15.5%	8.0%	25.82%	17.62%
pyrene	129-00-0		23%	27.3%	18.2%	12.4%	12.5%	25.76%	15.58%
triphenylene	217-59-4		N/A	17.9%	14.0%	11.4%	3.8%		
benzo[g,h,i]fluoranthene	203-12-3		N/A	11.6%	17.7%	11.8%	6.4%		
benzo[a]anthracene	56-55-3		18%	21.2%	12.5%	15.5%	7.4%	28.04%	15.17%
chrysene	218-01-9		20%	27.2%	12.2%	11.2%	5.1%	29.45%	23.42%
benzo[e]pyrene	192-97-2		N/A	9.5%	12.7%	11.1%	3.0%	33.02%	20.96%
benzo[b]fluoranthene	205-99-2		24%	28.9%	20.8%	26.2%	7.1%	32.93%	23.46%
dibenzo[a,c]anthracene	215-58-7		N/A	4.3%	15.9%	15.1%	3.3%		
benzo[k]fluoranthene	207-08-9		16%	17.1%	10.1%	35.7%	22.0%	33.04%	15.29%
dibenz[a,h]anthracene	53-70-3		19%	30.7%	12.6%	13.2%	3.0%	32.37%	25.00%
benzo[g,h,i]perylene	191-24-2		16%	14.7%	18.4%	14.6%	7.9%	31.24%	24.83%
indeno[1,2,3-c,d]pyrene	193-39-5		18%	30.8%	27.1%	21.6%	7.7%	36.79%	25.20%
anthanthrene	191-26-4		n/a	12.8%	49.9%	42.7%	45.1%	32.77%	21.69%

^a Analytical precision is defined in Section 3.2 of this appendix. Numbers given for specific agencies may be compound specific values or

represent the range of typical values depending on the compound and/or concentration range.

^b Established at January 2000 Workshop.

^c Between-run %RSD, based on equation 3-3; for PCBs/OCs data collected 1995; for PAHs data collected July/96 - Mar/97.

^d Between-run %RSD, based on equation 3-3, for spikes ($n > 7$) onto Poly-urethane foam (PUF) and glass fibre filters (GFF) conducted in parallel with analyses covering a full sampling year at PPT site (1994 for PCBs/OCs on PUF; 1994 for PAHs (except retene) on GFF; 1995 for retene on GFF; 1992 for PAHs on PUF).

^e Between-run %RSD, based on equation 3-3, for spikes onto clean-up media (Florisil for PCBs/OCs, Silica and Alumina-N Sep-Paks for PAHs), conducted in parallel with analyses covering a full sampling year at PPT site (1994 for PCBs/OCs on PUF; 1994 for PAHs (except retene) on GFF; 1995 for retene on GFF; 1992 for PAHs on PUF).

^f Between-run %RSD, based on equation 3-3, spiked onto XAD 2 and quartz fibre filter (QFF), using over 24 months data. N values are provided.

n/a Not applicable.

NA Data not available due to co-elutions with other spike compounds on DB5 GC/ECD method)

NP Spike not performed for this matrix.

NS This species not included in spiking mixture.

Table G-3. Overall precision for air organics concentration measurements^a

TABLE G-3. OVERALL PRECISION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS ^A						
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C	MSC ^D	IU ^E	
					XAD 2	QFF
Air Organics		±50-100%				
PCBs		±50-100%	N/A		n=24-32	n=24
Total PCBs			N/A		29.178%	25.038%
Congener # PCB 5/8	16605-91-7/34883-43-7				34.024%	23.938%
Congener # PCB 16	38444-78-9				35.429%	26.359%
Congener # PCB 17/15	37680-66-3/2050-68-2				26.155%	21.647%
Congener # PCB 18	37680-65-2		N/A		24.702%	15.405%
Congener # PCB 22	38444-85-8				34.415%	35.982%
Congener # PCB 28	7012-37-5				27.274%	30.890%
Congener # PCB 31	16606-02-3				32.961%	20.358%
Congener # PCB 32	38444-77-8				34.098%	36.832%
Congener # PCB 33	38444-86-9				31.221%	21.626%
Congener # PCB 44	41464-39-5				43.171%	56.226%
Congener # PCB 49	41464-40-8		N/A			
Congener # PCB 66	32598-10-0				45.165%	54.821%
Congener # PCB 70/76	32598-11-1/70362-48-0				33.446%	39.081%
Congener # PCB 87	38380-02-8		N/A			
Congener # PCB 95	38379-99-6				28.329%	31.631%
Congener # PCB 101	37680-73-2				23.015%	35.953%
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1				40.199%	30.980%
Congener # PCB 123/149	65510-44-3/38380-04-0				30.392%	28.190%
Congener # PCB 158	74472-42-7		N/A			
Congener # PCB 191	74472-50-7		N/A			
Congener # PCB 198	68194-17-2		N/A			
Congener # PCB 206	40186-72-9		N/A			
Congener # PCB 209	2051-24-3		N/A			
Pesticides		±50-100%	N/A		n=19-30	n=14-21
α-HCH	319-84-6		N/A		15.83%	22.92%
γ-HCH	58-89-9		N/A		25.53%	33.13%
DDT (+ metabolites)			N/A			
p,p'-DDT	50-29-3		N/A		32.28%	93.18%
o,p'-DDD	53-19-0		N/A			
p,p'-DDD	72-54-8		N/A		77.15%	67.51%
p,p'-DDE	72-55-9		N/A		19.66%	42.77%
chlordanne	57-74-9		N/A			
α-chlordanne	5103-71-9		N/A		28.56%	32.56%
γ-chlordanne	5103-74-2		N/A		36.09%	31.93%
nonachlor	3734-49-4		N/A			
trans-nonachlor	39765-80-5		N/A		41.68%	52.63%

TABLE G-3. OVERALL PRECISION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C	MSC ^D	IU ^E	
					XAD 2	QFF
endrin	70-20-8		N/A			
HCB	118-74-1		N/A		19.06%	30.38%
heptachlor epoxide	1024-57-3		N/A			
methoxychlor	72-43-5		N/A			
dieldrin	60-57-1		N/A		52.25%	30.51%
PAHs		±50-100%	n=5		n=21-26	n=10-23
acenaphthylene	208-96-8				27.83%	3.35% *
acenaphthene	83-32-9				33.44%	40.25% *
fluorene	86-73-7				21.70%	41.42%
phenanthrene	85-01-8				21.28%	33.50%
anthracene	120-12-7				35.26%	22.51%
fluoranthene	206-44-0				32.26%	36.41%
pyrene	129-00-0				44.85%	31.69%
retene	483-65-8				32.50%	38.97%
benzo[a]anthracene	56-55-3				38.41%	35.01%
chrysene	218-01-9				30.79%	30.89%
benzo[b]fluoranthene	205-99-2				38.13%	30.02%
benzo[k]fluoranthene	207-08-9					29.15%
benzo[e]pyrene	192-97-2				45.50%	32.47%
benzo[a]pyrene	50-32-8		10.28%			33.92%
indeno[1,2,3-c,d]pyrene	193-39-5					35.96%
dibenz[a,h]anthracene	53-70-3					27.39%
benzo[g,h,i]perylene	191-24-2					44.83%
coronene	191-07-1					27.55%

^A Overall precision is defined in Section 3.2 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^B From January 2000 Workshop.

^C RPD between two duplicates were calculated according to equation 3-6. Average RPD provided, n is in table. For Benzo(a)pyrene, data collected in 1995.

^D RPD between two duplicates were calculated according to equation 3-6. Average RPD over two years of data are provided. Zero values were excluded. N is listed in table.

*n<5

Table G-4. Limits of detection for air organics concentration measurements - ng/m³^a

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C NG/M ³ GAS AND PARTICLE	MSC ^D PG/M ³ GAS PHASE ^E	IU	
					GAS PHASE ^E , NG/M ³	PARTICULATE PHASE ^F , NG/M ³
Ambient Air Organics						
PCBs		0.003 ng/m ³			n=26	n=24
Total PCBs					0.0399	0.02241
Congener # PCB 1	2051-60-7			0.974		
Congener # PCB 3	2051-62-9			8.008		
Congener # PCB 4	13029-08-8/33146-45-1			17.561		
Congener # PCB 4/10	13029-08-8/33146-45-1			17.419	0.00142	0.00016
Congener # PCB 5	16605-91-7		0.00056	0.149		
Congener # PCB 5/8	16605-91-7/34883-43-7				0.00469	0.00176
Congener # PCB 6	25569-80-6		0.000918	7.285	0.00045	0.00019
Congener # PCB 7	33284-50-3			16.527		
Congener # PCB 7/9	33284-50-3/34883-39-1				0.00020	0.00011
Congener # PCB 8	34883-43-7		0.00111	9.114		
Congener # PCB 10	33146-45-1			1.112		
Congener # PCB 12	2974-92-7					0.00011
Congener # PCB 12/13	2974-92-7/2974-90-5			0.272		
Congener # PCB 13	2974-90-5				0.00004	0.00009
Congener # PCB 15	2050-68-2		0.0048	3.416		
Congener # PCB 16	38444-78-9		0.00139	9.208	0.00075	0.00051
Congener # PCB 16/32	38444-78-9/39444-77-8					
Congener # PCB 17	37680-66-3		0.000647	4.439		
Congener # PCB 17/15	37680-66-3/2050-68-2				0.00237	0.00095
Congener # PCB 18	37680-65-2		0.000634	21.489	0.00161	0.00070
Congener # PCB 19	38444-73-4			3.117	0.00025	0.00012
Congener # PCB 21	55702-46-0		0.000783	0.115		
Congener # PCB 21/33/53	55702-46-0/38444-86-9/ 41464-41-9			3.012		
Congener # PCB 22	38444-85-8		0.000631	2.417	0.00182	0.00068
Congener # PCB 24	55702-45-9			1.127	0.00040	0.00013
Congener # PCB 24/27	55702-45-9/38444-76-7			0.329		
Congener # PCB 25	55712-37-3			0.726	0.00028	0.00024
Congener # PCB 26	38444-81-4			1.202	0.00047	0.00014
Congener # PCB 27	38444-76-7			1.506	0.00008	0.00004
Congener # PCB 28	7012-37-5		0.000518	2.945	0.00310	0.00141
Congener # PCB 28/31	7012-37-5/16606-02-3			-		
Congener # PCB 29	15862-07-4			0.115	0.00002	0.00026
Congener # PCB 30	35693-92-6			0.921		
Congener # PCB 31	16606-02-3		0.000698	6.245	0.00175	0.00069
Congener # PCB 32	38444-77-8			5.722	0.00069	0.00045
Congener # PCB 33	38444-86-9		0.000518	4.028	0.00197	0.00089
Congener # PCB 37	38444-90-5		0.000678	1.025	0.00112	0.00021
Congener # PCB 37/42	38444-90-5/36559-22-5			1.72		
Congener # PCB 40	38444-93-8			0.34	0.00034	0.00023
Congener # PCB 41	52663-59-9		0.000448	1.661		
Congener # PCB 41/71	52663-59-9/41464-46-4				0.00061	0.00024
Congener # PCB 41/64/71	52663-59-9/52663-58-8/ 41464-46-4			2.912		
Congener # PCB 42	36559-22-5		0.000446	0.854	0.00331	0.00024
Congener # PCB 43	70362-46-8			1.439	0.00006	0.00013

TABLE G-4. LIMITS OF DETECTION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS - NG/M³^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C NG/M ³ GAS AND PARTICLE	MSC ^D PG/M ³ GAS PHASE ^E	IU	
					GAS PHASE ^E , NG/M ³	PARTICULATE PHASE ^F , NG/M ³
Congener # PCB 43/52	70362-46-8/35693-99-3					
Congener # PCB 44	41464-39-5			1.331	0.00172	0.00377
Congener # PCB 45	70362-45-7			0.157	0.00019	0.00007
Congener # PCB 46	41464-47-5			0.128	0.00021	0.00021
Congener # PCB 47	2437-79-8		0.000763	1.89	0.00030	0.00013
Congener # PCB 47/48	2437-79-8/70362-47-9			3.001		
Congener # PCB 48	70362-47-9			0.13	0.00025	0.00018
Congener # PCB 49	41464-40-8		0.00128	1.302	0.00080	0.00022
Congener # PCB 51	68194-04-7			0.121	0.00002	0.00002
Congener # PCB 52	35693-99-3		0.000442	2.052	0.00287	0.00089
Congener # PCB 53	41464-41-9		0.000521	1.761	0.00021	0.00050
Congener # PCB 56	41464-43-1		0.00100	0.837		
Congener # PCB 56/60	41464-43-1/33025-41-1			0.702	0.00149	0.00029
Congener # PCB 60	33025-41-1			0.753		
Congener # PCB 61	33284-53-6			1.213		
Congener # PCB 63	74472-34-7				0.00001	0.00032
Congener # PCB 64	52663-58-8			0.112	0.00063	0.00018
Congener # PCB 66	32598-10-0		0.000701	-	0.00122	0.00046
Congener # PCB 66/95	32598-10-0/38379-99-6					
Congener # PCB 70	32598-11-1		0.000602	1.368		
Congener # PCB 71	N/A			0.655		
Congener # PCB 70/76	32598-11-1/70362-48-0				0.00109	0.00058
Congener # PCB 74	32690-93-0		0.00526	0.137	0.00059	0.00018
Congener # PCB 75	32598-12-2			3.846		
Congener # PCB 76	70362-48-0		0.000650	1.903		
Congener # PCB 77	32598-13-3		0.00115	10.185		0.00002
Congener # PCB 77/110	32598-13-3/38380-03-9			0.729		
Congener # PCB 81	70362-50-4		0.00118	-	0.00024	0.00014
Congener # PCB 81/87	70362-50-4/38380-02-8			2.058		
Congener # PCB 82	52663-62-4			0.942	0.00009	0.00008
Congener # PCB 83	60145-20-2			0.104	0.00027	0.00011
Congener # PCB 84	52663-60-2		0.00383	0.847		
Congener # PCB 84/92	52663-60-2/52663-61-3				0.0015	0.00090
Congener # PCB 85	65510-45-4			0.073	0.00027	0.00032
Congener # PCB 87	38380-02-8		0.000990	0.515	0.00067	0.00213
Congener # PCB 89	73575-57-2			1.694	0.00006	0.00012
Congener # PCB 91	68194-05-8			1.852	0.00029	0.00013
Congener # PCB 92	52663-61-3		0.00606	0.965		
Congener # PCB 95	38379-99-6		0.00206	1.205	0.00189	0.00082
Congener # PCB 97	41464-51-1		0.000445	1.333	0.00026	0.00011
Congener # PCB 99	38380-01-7		0.000996	0.089	0.00054	0.00020
Congener # PCB 100	39485-83-1			0.092	0.00002	0.00020
Congener # PCB 101	37680-73-2		0.000468	0.657	0.00152	0.00060
Congener # PCB 105	32598-14-4		0.000779	0.597		
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1			-	0.00119	0.00102
Congener # PCB 107	70424-68-9				0.00009	0.00006
Congener # PCB 110	38380-03-9		0.000644		0.00125	0.00068
Congener # PCB 114	74472-37-0		0.000471	2.255		
Congener # PCB 114/131	74472-37-0/61798-70-7					0.00033
Congener # PCB 118	31508-00-6		0.000430	0.106	0.00081	0.00027

TABLE G-4. LIMITS OF DETECTION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS - NG/M ³ ^A					
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C NG/M ³ GAS AND PARTICLE	MSC ^D PG/M ³ GAS PHASE ^E	IU
				GAS PHASE ^E , NG/M ³	PARTICULATE PHASE ^F , NG/M ³
Congener # PCB 119	56558-17-9		0.000609	0.00005	0.00007
Congener # PCB 123/149	65510-44-3/38380-04-0			0.00052	0.00049
Congener # PCB 123	N/A		0.117		
Congener # PCB 124	N/A		0.966		
Congener # PCB 126	57464-28-8		0.00132	0.103	
Congener # PCB 128	38380-07-3			0.128	0.00012
Congener # PCB 129	5521-18-4			0.155	0.00012
Congener # PCB 129/178	5521-18-4/52663-67-9			0.15	
Congener # PCB 130	52663-66-8			0.11	0.00001
Congener # PCB 130/137/176	52663-66-8/35694-06-5/ 52663-65-7				
Congener # PCB 131	61798-70-7			0.083	
Congener # PCB 132	38380-05-1		0.000620	0.421	
Congener # PCB 132/153	38380-05-1/35065-27-1			1.055	
Congener # PCB 134	52704-70-8			0.073	0.00002
Congener # PCB 135	52744-13-5			1.66	
Congener # PCB 135/144	52744-13-5/68194-14-9			1.022	0.0050
Congener # PCB 136	38411-22-2		0.000796	0.432	0.00030
Congener # PCB 137	35694-06-5			.088	
Congener # PCB 137/176	35694-06-5/52663-65-7				0.00002
Congener # PCB 138	35065-28-2		0.000834	1.057	
Congener # PCB 138/163	35065-28-2/74472-44-9				0.00091
Congener # PCB 141	52712-04-6			0.063	0.00014
Congener # PCB 146	51908-16-8				0.00019
Congener # PCB 147	N/A			1.03	
Congener # PCB 149	38380-04-0		0.000485	0.531	
Congener # PCB 151	52663-63-5				0.00014
Congener # PCB 153	35065-27-1		0.000509	0.317	
Congener # PCB 155	38380-08-4			0.649	
Congener # PCB 156	38380-08-4		0.000537	0.819	0.00006
Congener # PCB 157	69782-90-7/52663-73-7			1.973	
Congener # PCB 157/200	69782-90-7/52663-73-7				0.00005
Congener # PCB 157/200/204	69782-90-7/52663-73-7/ 74472-52-9			0.27	
Congener # PCB 158	74472-42-7			9.996	0.00007
Congener # PCB 163	N/A			0.113	
Congener # PCB 166	N/A			0.103	
Congener # PCB 167	52663-72-6				0.00003
Congener # PCB 169	32774-16-6		0.00108	0.156	
Congener # PCB 170	32774-16-6			0.092	
Congener # PCB 170/190	35065-30-6/41411-64-7			0.7	0.00017
Congener # PCB 171/202	52663-71-5/2136-99-4			0.443	0.00002
Congener # PCB 172	52663-74-8			0.062	0.00052
Congener # PCB 172/197	52663-74-8/33091-17-7			0.19	
Congener # PCB 173	68194-16-1		0.000670	0.117	0.00029
Congener # PCB 174	38411-25-5			0.068	0.00003
Congener # PCB 175	40186-70-7			0.15	0.00001
Congener # PCB 177	52663-70-4			0.25	0.00004
Congener # PCB 178	52663-67-9			0.077	0.00004
Congener # PCB 180	35065-29-3		0.000520	0.907	0.00008
Congener # PCB 182				0.219	

TABLE G-4. LIMITS OF DETECTION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS - NG/M ³ ^A						
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C NG/M ³ GAS AND PARTICLE	MSC ^D PG/M ³ GAS PHASE ^E	IU	
					GAS PHASE ^E , NG/M ³	PARTICULATE PHASE ^F , NG/M ³
Congener # PCB 182/187	60145-23-5/52663-68-0			0.42	0.00009	0.00020
Congener # PCB 183	52663-69-1			0.079	0.00002	0.00011
Congener # PCB 185	52712-05-7			0.08	0.00003	0.00004
Congener # PCB 189	39635-31-9			0.124		0.00004
Congener # PCB 190	N/A			0.104		
Congener # PCB 191	74472-50-7		0.000416	0.227		0.00001
Congener # PCB 193	69782-91-8			0.077	0.00003	0.00008
Congener # PCB 194	35694-08-7		0.000617	0.124		0.00009
Congener # PCB 195	52663-78-2		0.00116	0.146		
Congener # PCB 195/208	52663-78-2/52663-77-1			0.23		0.00017
Congener # PCB 196	42740-50-1			0.09		0.00011
Congener # PCB 196/203	42740-50-1/52663-76-0			2.51		
Congener # PCB 197	33091-17-7					0.00010
Congener # PCB 198	68194-17-2			0.111	0.01779	0.01502
Congener # PCB 199	52663-73-7			0.091		0.00129
Congener # PCB 200	40186-71-8			0.078		
Congener # PCB 200_A	N/A			0.205		
Congener # PCB 201	52663-75-9			0.164	0.00176	0.00113
Congener # PCB 202	40186-71-8			0.097		
Congener # PCB 203	52663-76-0			0.11		0.00020
Congener # PCB 204	52663-76-0			0.082		
Congener # PCB 205	74472-53-0		0.000480	0.134		
Congener # PCB 206	40186-72-9		0.00142	0.268	0.00007	0.00336
Congener # PCB 207	52663-79-3			0.128		0.00002
Congener # PCB 209	2051-24-3			0.158	0.00004	0.00003
Pesticides		0.03 ng/m ³			n=29	n=27
α-HCH	319-84-6		0.00512	1.72	0.00112	0.00331
β-HCH	319-85-7		0.00168	3.27		
δ-HCH	319-86-8			2.08		
γ-HCH	58-89-9		0.00231	4.35	0.00069	0.00134
DDT (+ metabolites)						
p,p'-DDT	50-29-3		0.00254	0.15	0.00037	0.00303
o,p'-DDT	784-02-6		0.00186	0.43		
o,p'-DDD	53-19-0			0.30		
p,p'-DDD	72-54-8		0.00111	0.19	0.00113	0.00123
p,p'-DDE	72-55-9		0.00207	2.04	0.00146	0.00090
chlordanne	57-74-9					
α-chlordanne	5103-71-9		0.00198	0.25	0.00324	0.00461
γ-chlordanne	5103-74-2		0.00173	0.75	0.00129	0.00082
nonachlor	3734-49-4					
trans-nonachlor	39765-80-5			0.7	0.00049	0.00306
endrin	70-20-8			6.50		
HCB	118-74-1		0.00129	9.98	0.00279	0.00038
heptachlor epoxide	1024-57-3		0.00198	1.54		
methoxychlor	72-43-5		0.00281	13.81		
dieledrin	60-57-1		0.00945	0.90	0.00068	0.00614
heptachlor	76-44-8		0.00272	2.25		
endosulfan I (a)	959-98-8		0.0130	3.43		
endosulfan II (b)	33213-65-9		0.0160	1.51		
aldrin	309-00-2		0.00501	1.74		
mirex	2385-85-5		0.00279	0.08		

TABLE G-4. LIMITS OF DETECTION FOR AIR ORGANICS CONCENTRATION MEASUREMENTS - NG/M ³ ^A					
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C NG/M ³ GAS AND PARTICLE	MSC ^D PG/M ³ GAS PHASE ^E	IU
					GAS PHASE ^E , NG/M ³ PARTICULATE PHASE ^F , NG/M ³
photomirex	39801-14-4			0.19	
oxychlordane	26880-48-8		0.00263	0.14	
PAHs		0.003 ng/m ³			n=22 n=21
benzo[a]pyrene	50-32-8		0.016		0.02465 0.02045
acenaphthene	83-32-9		n/a		0.00099
acenaphthylene	208-96-8		n/a		
anthracene	120-12-7		n/a		0.00122
benzo[a]anthracene	56-55-3		0.016		0.04379
benzo[b]fluoranthene	205-99-2		0.033		0.00754
benzo[k]fluoranthene	207-08-9		0.033		0.00685
benzo[g,h,i]perylene	191-24-2		0.033		
benzo(e)pyrene	192-97-2		n/a		0.00585 0.01517
chrysene	218-01-9		0.033		0.00143 0.02789
dibenz[a,h]anthracene	53-70-3		0.033		0.01087
fluoranthene	206-44-0		0.016		0.02857 0.00265
fluorene	86-73-7		n/a		0.00364 0.00582
indeno[1,2,3-c,d]pyrene	193-39-5		0.033		0.00964
phenanthrene	85-01-8		0.0817		0.05857 0.00044
pyrene	129-00-0		0.016		0.01366 0.02600
retene	483-65-8		n/a		0.00268 0.00161
coronene	191-07-1		n/a		0.00916

^a Limits of detection are defined in Section 3.3 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound.

^b Based on January 2000 Workshop.

^c The values listed for OME are the Method Detection Limit (MDL) and divided by a presumed sample volume of 612 m³ (see section 3.3.2).

^d Average sample volume for MSC is 350 m³ and LOD is calculated using equation 3-13.

^e Average sample volume for IU airborne gas phase is 815 m³ and LOD is calculated using equation 3-13.

^f Average sample volume for IU airborne particulate phase is 1630 m³ and LOD is calculated using equation 3-13.

n/a Not applicable.

Table G-5. Analytical recovery for precipitation organics concentration measurements^a

TABLE G-5. ANALYTICAL RECOVERY FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS ^A					
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C	NLET	IU ^D
Precipitation Organics		50-130%			n=35
PCBs		50-130%	n=12		
Total PCBs					89.67%
Congener # PCB 1	2051-60-7				
Congener # PCB 3	2051-62-9			55%	
Congener # PCB 4/10	13029-08-8/33146-45-1			21%	63.45%
Congener # PCB 5/8	16605-91-7/34883-43-7			78%	81.93%
Congener # PCB 6	25569-80-6			81%	81.04%
Congener # PCB 7/9	33284-50-3/34883-39-1			78%	79.08%
Congener # PCB 8	34883-43-7		92.7%		
Congener # 12	2974-92-7				49.04%
Congener # 12/13	2974-92-7/2974-90-5			98%	
Congener # 13	2974-90-5				38.35%
Congener # PCB 15/17	2050-68-2/37680-66-3				84.14%
Congener # PCB 15/18	2050-68-2/37680-65-2			82%	
Congener # PCB 16	38444-78-9			70%	82.25%
Congener # PCB 17	37680-66-3			81%	
Congener # PCB 18	37680-65-2				85.75%
Congener # PCB 19	38444-73-4			58%	76.78%
Congener # PCB 21	55702-46-0		99.7%		
Congener # PCB 22	38444-85-8			84%	89.14%
Congener # PCB 24	55702-45-9				78.55%
Congener # PCB 24/27	55702-45-9/38444-76-7			79%	
Congener # PCB 25	55712-37-3			45%	84.75%
Congener # PCB 26	38444-81-4			83%	87.52%
Congener # PCB 27	38444-76-7				85.14%
Congener # PCB 28	7012-37-5			80%	89.03%
Congener # PCB 29	15862-07-4			83%	86.60%
Congener # PCB 31	16606-02-3			84%	86.67%
Congener # PCB 32	38444-77-8			83%	85.12%
Congener # PCB 33	38444-86-9				90.14%
Congener # PCB 33/20/53	38444-86-9/38444-84-7/ 41464-41-9			85%	
Congener # PCB 37	38444-90-5				94.49%
Congener # PCB 40	38444-93-8			95%	89.51%
Congener # PCB 41/64/71	52663-59-9/52663-58-8/ 41464-46-4			87%	
Congener # PCB 42	36559-22-5				89.1%
Congener # PCB 42/59	36559-22-5/74472-33-6			88%	
Congener # PCB 43	70362-46-8				86.5%
Congener # PCB 44	41464-39-5			87%	91.38%
Congener # PCB 45	70362-45-7			86%	83.24%
Congener # PCB 46	41464-47-5			84%	86.73%
Congener # PCB 47	2437-79-8			89%	86.16%
Congener # PCB 48	70362-47-9			83%	89.61%
Congener # PCB 49	41464-40-8				89.87%
Congener # PCB 49/43	41464-40-8/70362-46-8			91%	
Congener # PCB 51	68194-04-7			83%	84.26%
Congener # PCB 52	35693-99-3			88%	89.80%
Congener # PCB 53	41464-41-9				85.11%
Congener # PCB 56/60	41464-43-1/33025-41-1			91%	92.98%
Congener # PCB 63	774472-34-7				83.06%
Congener # PCB 64	52663-58-8				89.42%
Congener # PCB 66	32598-10-0		87.0%	87%	93.98%

TABLE G-5. ANALYTICAL RECOVERY FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C	NLET	IU ^D
Congener # PCB 70/76	32598-11-1/70362-48-0				92.87%
Congener # PCB 70/76/98	32598-11-1/70362-48-0/ 60233-25-2			86%	
Congener # PCB 74	32690-93-0				92.21%
Congener # PCB 77	32598-13-3				94.58%
Congener # PCB 81	70362-50-4				98.16%
Congener # PCB 82	52663-62-4			89%	94.21%
Congener # PCB 83	60145-20-2			95%	93.29%
Congener # PCB 84/92	52663-60-2/52663-61-3			95%	95.91%
Congener # PCB 85	65510-45-4				94.65%
Congener # PCB 87	52663-68-0				94.81%
Congener # PCB 87/81	52663-68-0/70362-50-4			91%	
Congener # PCB 89	73575-57-2				92.13%
Congener # PCB 91	68194-05-8				94.49%
Congener # PCB 91/55	68194-05-8/74338-24-2			95%	
Congener # PCB 95	38379-99-6			86%	90.31%
Congener # PCB 97	41464-51-1			93%	93.96%
Congener # PCB 99	38380-01-7			92%	123.76%
Congener # PCB 100	39485-83-1				104.05%
Congener # PCB 100/67	39485-83-1/73575-53-8			90%	
Congener # PCB 101	37680-73-2			91%	94.89%
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1				92.59%
Congener # PCB 107	70424-68-9				99.56%
Congener # PCB 110	38380-03-9		89.6%	95%	94.70%
Congener # PCB 114/131	74472-37-0/61798-70-7				105.90%
Congener # PCB 118	31508-00-6			92%	94.29%
Congener # PCB 119	56558-17-9			86%	95.98%
Congener # PCB 123/149	65510-44-3/38380-04-0				93.95%
Congener # PCB 128	38380-07-3			98%	91.71%
Congener # PCB 129	55215-18-4			89%	98.39%
Congener # PCB 130	52663-66-8				90.61%
Congener # PCB 130/176	52663-66-8/52663-65-7			41%	
Congener # PCB 134	85704-70-8				93.00%
Congener # PCB 135/144	52744-13-5/68194-14-9				91.76%
Congener # PCB 135/144/147	52744-13-5/68194-14-9/ 68194-13-8			96%	
Congener # PCB 136	38411-22-2		89.4%		90.40%
Congener # PCB 136/77	38411-22-2/32598-13-3			94%	
Congener # PCB 137	35694-06-5			100%	
Congener # PCB 137/176	35694-06-5/52663-65-7				91.19%
Congener # PCB 138/163	35065-28-2/74472-44-9			92%	95.12%
Congener # PCB 141	52712-04-6			92%	92.83%
Congener # PCB 146	51908-16-8			93%	95.59%
Congener # PCB 151	52663-63-5			90%	92.26%
Congener # PCB 153	35065-27-1			86%	
Congener # PCB 156	38380-08-4				89.01%
Congener # PCB 156/171	38380-08-4/52663-71-5			87%	
Congener # PCB 157/200	69782-90-7/52663-73-7				97.63%
Congener # PCB 158	74472-42-7			93%	89.70%
Congener # PCB 167	52663-72-6			29%	100.60%
Congener # PCB 170	35065-30-6			79%	
Congener # PCB 170/190	35065-30-6/41411-64-7				94.90%
Congener # PCB 171/202	52663-71-5/2136-99-4				93.47%
Congener # PCB 172	52663-74-8			92%	94.57%
Congener # PCB 173	68194-16-1				95.44%
Congener # PCB 173/157	68194-16-1/69782-90-7			82%	
Congener # PCB 174	38411-25-5			91%	91.5%

TABLE G-5. ANALYTICAL RECOVERY FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C	NLET	IU ^D
Congener # PCB 175	40186-70-7			96%	90.69%
Congener # PCB 177	52663-70-4			91%	92.60%
Congener # PCB 178	52663-67-9			95%	94.59%
Congener # PCB 180	35065-29-3			99%	93.05%
Congener # PCB 182/187	60145-23-5/52663-68-0			98%	91.45%
Congener # PCB 183	52663-69-1			91%	96.03%
Congener # PCB 185	52712-05-7			93%	93.49%
Congener # PCB 189	39635-31-9			88%	109.36%
Congener # PCB 190	41411-64-7			88%	
Congener # PCB 191	74472-50-7		83.0%	92%	89.93%
Congener # PCB 193	69782-91-8			92%	89.32%
Congener # PCB 194	35694-08-7			93%	95.38%
Congener # PCB 195	52663-78-2			87%	
Congener # PCB 195/208	52663-78-2/52663-77-1				93.24%
Congener # PCB 196	42740-50-1				90.41%
Congener # PCB 197	33091-17-7			93%	91.73%
Congener # PCB 198	68194-17-2			154%	113.91%
Congener # PCB 199	52663-73-7			92%	93.50%
Congener # PCB 200	40186-71-8			83%	97.63%
Congener # PCB 201	52663-75-9			94%	92.41%
Congener # PCB 202	2136-99-4			88%	
Congener # PCB 203	52663-76-0				96.01%
Congener # PCB 203/196	52663-76-0/42740-50-1			92%	
Congener # PCB 205	4472-53-0		83.6%	99%	91.50%
Congener # PCB 206	40186-72-9			85%	94.77%
Congener # PCB 207	52663-79-3			90%	103.84%
Congener # PCB 209	2051-24-3			82%	82.98%
Pesticides		50-130%	n=12		n=22
α -HCH	319-84-6		93.8%	70-100%	52.03%
γ -HCH	58-89-9		125.0%	70-100%	55.58%
DDT (+ metabolites)				80-120%	
o,p'-DDT	789-02-6		168.0%		
p,p'-DDT	50-29-3		46.4%	80-120%	90.44%
o,p'-DDD	53-19-0			80-120%	
p,p'-DDD	72-54-8		59.9%	80-110%	78.44%
p,p'-DDE	72-55-9		43.1%	80-110%	90.83%
chlordane	57-74-9			80-110%	
α -chlordane	5103-71-9				85.12%
γ -chlordane	5103-74-2				82.01%
oxychlordane	27304-13-8				
nonachlor	3734-49-4			n/a	
trans-nonachlor	39765-80-5				
endrin	70-20-8			70-120%	
HCB	118-74-1		82.2%	80-110%	68.17%
heptachlor epoxide	1024-57-3		82.7%	80-110%	
methoxychlor	72-43-5			80-130%	
dieldrin	60-57-1		97.9%	80-110%	84.68%
heptachlor	76-44-8		93.8%		
endosulfan I (a)	959-98-7		94.5%		
endosulfan II (b)	33213-65-9		96.0%		
PAHs		50-130%			n=18
benzo[a]pyrene	50-32-8		85.34%	80-110%	84.23%
acenaphthene	83-32-9			80-110%	14.58%
acenaphthylene	208-96-8			80-110%	22.27%
anthracene	120-12-7				64.03%
benzo[a]anthracene	56-55-3				82.46%
benzo[b]fluoranthene	205-99-2			80-110%	89.01%

TABLE G-5. ANALYTICAL RECOVERY FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME ^C	NLET	IU ^D
benzo[k]fluoranthene	207-08-9			80-110%	93.91%
benzo[g,h,i]perylene	191-24-2			80-110%	89.47%
benzo(e)pyrene	192-97-2				81.19%
chrysene	218-01-9				88.48%
dibenz[a,h]anthracene	53-70-3				96.68%
fluoranthene	206-44-0			80-110%	88.46%
fluorene	86-73-7			80-110%	61.34%
indeno[1,2,3-c,d]pyrene	193-39-5			80-110%	92.85%
phenanthrene	85-01-8			80-110%	68.26%
pyrene	129-00-0			80-110%	82.27%
retene	483-65-8				88.67%
coronene	191-07-1				78.69%

^a Analytical recovery, a measure of analytical accuracy, is defined in Section 3.1 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Based on the January 2000 Workshop.

^c Based on matrix spikes, using equation 3-2. Data for PCBs/OCs collected 1995.

^d Based on matrix spikes, using equation 3-2.

n/a Not applicable.

Table G-6. Analytical precision for precipitation organics concentration measurements^a

TABLE G-6. ANALYTICAL PRECISION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS ^A					
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	NLET ^C	IU
Precipitation Organics		±50-100%			
PCBs		±50-100%	n=12		n=35
Total PCBs				4.86%	10.58%
Congener # PCB 1	2051-60-7			11.35%	
Congener # PCB 3	2051-62-9			4.00%	
Congener # PCB 4/10	13029-08-8/33146-45-1			7.46%	33.77%
Congener # PCB 5/8	16605-91-7/34883-43-7			3.54%	12.73%
Congener # PCB 6	25569-80-6			3.88%	13.64%
Congener # PCB 7/9	33284-50-3/34883-39-1			2.83%	15.44%
Congener # PCB 8	34883-43-7		19.7%		
Congener # PCB 12	2974-92-7				48.22%
Congener # PCB 12/13	2974-92-7/2974-90-5			3.19%	
Congener # PCB 13	2974-90-5				35.51%
Congener # PCB 15/17	2050-68-2/37680-66-3			3.17%	12.84%
Congener # PCB 16	38444-78-9				15.69%
Congener # PCB 17	37680-66-3			3.74%	
Congener # PCB 18	37680-65-2			3.55%	11.65%
Congener # PCB 19	38444-73-4			5.05%	21.96%
Congener # PCB 21	55702-46-0		20.6%		
Congener # PCB 22	38444-85-8				11.65%
Congener # PCB 22/51	38444-85-8/68194-04-7			3.24%	
Congener # PCB 24	55702-45-9				27.68%
Congener # PCB 25	55712-37-3			4.04%	15.58%
Congener # PCB 26	38444-81-4			3.88%	12.50%
Congener # PCB 27	38444-76-7				14.61%
Congener # PCB 27/24	38444-76-7/55702-45-9			3.76%	
Congener # PCB 28	7012-37-5				12.95%
Congener # PCB 28/31	7012-37-5/16606-02-3			3.45%	17.07%
Congener # PCB 32	38444-77-8				12.09%
Congener # PCB 33	38444-86-9				11.34%
Congener # PCB 33/53/20	38444-86-9/41464-41-9/ 38444-84-7			3.29%	
Congener # PCB 37	38444-90-5				13.96%
Congener # PCB 40	38444-93-8			4.15%	12.49%
Congener # PCB 41/71	52663-59-9/41464-46-4				10.78%
Congener # PCB 41/71/64	52663-59-9/41464-46-4/ 52663-58-8			3.84%	
Congener # PCB 42	36559-22-5				11.83%
Congener # PCB 42/59	36559-22-5/74472-33-6			3.33%	
Congener # PCB 43	70362-46-8				13.55%
Congener # PCB 44	41464-39-5			3.48%	11.23%
Congener # PCB 45	70362-45-7			2.73%	14.99%
Congener # PCB 46	41464-47-5			4.10%	13.37%
Congener # PCB 47	2437-79-8				12.82%
Congener # PCB 47/48	2437-79-8/70362-47-9			11.86%	
Congener # PCB 48	70362-47-9				10.75%
Congener # PCB 49	41464-40-8				10.44%
Congener # PCB 49/43	41464-40-8/70362-46-8			3.64%	
Congener # PCB 51	68194-04-7				15.67%
Congener # PCB 52	35693-99-3			3.33%	10.18%
Congener # PCB 53	41464-41-9				14.62%
Congener # PCB 56/60	41464-43-1/33025-41-1			4.60%	14.49%
Congener # PCB 63	74472-34-7			3.45%	35.68%
Congener # PCB 64	52663-58-8				11.01%

TABLE G-6. ANALYTICAL PRECISION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	NLET ^C	IU
Congener # PCB 66	32598-10-0		17.7%		11.32%
Congener # PCB 66/95	32598-10-0/38379-99-6			4.06%	
Congener # PCB 70/76	32598-11-1/70362-48-0				11.06%
Congener # PCB 70/76/98	32598-11-1/70362-48-0/ 60233-25-2			4.15%	
Congener # PCB 74	32690-93-0			4.23%	10.94%
Congener # PCB 77	32598-13-3				24.57%
Congener # PCB 81	70362-50-4				23.14%
Congener # PCB 81/87	70362-50-4/38380-02-8			4.97%	
Congener # PCB 82	52663-62-4				13.36%
Congener # PCB 82/151	52663-62-4/52663-63-5			5.28%	
Congener # PCB 83	60145-20-2			6.10%	17.68%
Congener # PCB 84	52663-60-2			4.22%	
Congener # PCB 84/92	52663-60-2/52663-61-3				11.48%
Congener # PCB 85	65510-45-4			5.23%	10.74%
Congener # PCB 87	38380-02-8				11.40%
Congener # PCB 89	73575-57-2				23.29%
Congener # PCB 91	68194-05-8				17.41%
Congener # PCB 91/55	68194-05-8/74438-24-2			3.75%	
Congener # PCB 92	52663-61-3			3.99%	
Congener # PCB 95	38379-99-6				12.56%
Congener # PCB 97	41464-51-1			4.84%	11.66%
Congener # PCB 99	38380-01-7			4.55%	53.89%
Congener # PCB 100	39485-83-1			4.36%	53.14%
Congener # PCB 101	37680-73-2			4.27%	12.29%
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1				14.81%
Congener # PCB 105/132	32598-14-4/38380-05-1			5.32%	
Congener # PCB 107	70424-68-9				33.16%
Congener # PCB 107/147	70424-68-9/68194-13-8			6.70%	
Congener # PCB 110	38380-03-9		14.6%	5.12%	12.235
Congener # PCB 114/131	74472-37-0/61798-70-7				26.51%
Congener # PCB 118	31508-00-6				12.32%
Congener # PCB 118/149	31508-00-6/38380-04-0			5.12%	
Congener # PCB 119	56558-17-9			5.76%	34.68%
Congener # PCB 123/149	65510-44-3/38380-04-0				10.475
Congener # PCB 126/178	574655-28-8				
Congener # PCB 128	38380-07-3				17.73%
Congener # PCB 128/167	38380-07-3/52663-72-6			6.73%	
Congener # PCB 129	55215-18-4				38.51%
Congener # PCB 129/178	55215-18-4/52663-67-9			6.21%	
Congener # PCB 130	52663-66-8				36.91%
Congener # PCB 130/176	52663-66-8/52663-65-7			3.57%	
Congener # PCB 131	61798-70-7			7.05%	
Congener # PCB 134	52704-70-8				27.65%
Congener # PCB 134/114	52704-70-8/74472-37-0			6.73%	
Congener # PCB 135/144	52744-13-5/68194-14-9			5.43%	11.84%
Congener # PCB 136	38411-22-2		13.4%	5.05%	13.45%
Congener # PCB 137	35694-06-5			7.88%	
Congener # PCB 137/176	35694-06-5/52663-65-7				12.49%
Congener # PCB 138/163	35065-28-2/74472-46-1			5.73%	17.89%
Congener # PCB 141	52712-04-6			6.39%	9.46%
Congener # PCB 146	51908-16-8				14.01%
Congener # PCB 151	52663-63-5				10.63%
Congener # PCB 153	35065-27-1			5.54%	
Congener # PCB 156	38380-08-4				22.29%
Congener # PCB 157/200	69782-90-7/52663-73-7				32.16%

TABLE G-6. ANALYTICAL PRECISION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	NLET ^C	IU
Congener # PCB 157/200/173	69782-90-7/52663-73-7/ 68194-16-1			1.63%	
Congener # PCB 158	74472-42-7			5.59%	21.89%
Congener # PCB 167	52663-72-6				58.09%
Congener # PCB 170/190	35065-30-6/41411-64-7			6.63%	11.10%
Congener # PCB 171/202	52663-71-5/2136-99-4				10.06%
Congener # PCB 171/202/156	52663-71-5/2136-99-4/ 38380-08-4			6.02%	
Congener # PCB 172	52663-74-8			6.58%	13.39%
Congener # PCB 173	68194-16-1				43.64%
Congener # PCB 174	38411-25-5			6.22%	11.72%
Congener # PCB 175	40186-70-7			7.24%	13.74%
Congener # PCB 177	52663-70-4			6.33%	10.39%
Congener # PCB 178	52663-67-9				13.92%
Congener # PCB 180	35065-29-3			6.42%	10.12%
Congener # PCB 182/187	60145-23-5			5.88%	13.20%
Congener # PCB 183	52663-69-1			6.26%	20.54%
Congener # PCB 185	52712-05-7			6.97%	11.01%
Congener # PCB 189	39635-31-9			8.63%	37.07%
Congener # PCB 191	74472-50-7		17.0%	7.29%	30.89%
Congener # PCB 193	69782-91-8			6.17%	19.05%
Congener # PCB 194	35694-08-7			6.71%	12.29%
Congener # PCB 195/208	52663-78-2/52663-77-1			6.78%	12.64%
Congener # PCB 196	42740-50-1				22.17%
Congener # PCB 196/203	42740-50-1/52663-76-0			6.70%	22.17%
Congener # PCB 197	33091-17-7			8.41%	23.78%
Congener # PCB 198	68194-17-2			6.62%	39.61%
Congener # PCB 199	52663-73-7			7.94%	14.50%
Congener # PCB 201	52663-75-9			6.53%	20.94%
Congener # PCB 203	52663-76-0				12.88%
Congener # PCB 205	4472-53-0		20.0%	7.12%	16.13%
Congener # PCB 206	40186-72-9			6.48%	13.44%
Congener # PCB 207	52663-79-3			6.95%	51.28%
Congener # PCB 209	2051-24-3			8.56%	46.85%
Pesticides		±50-100%	n=12		n=22
α-HCH	319-84-6		14.8%	8.74%	51.99%
β-HCH	319-85-7				
γ-HCH	58-89-9		39.1%	5.64%	47.73%
DDT (+ metabolites)					
o,p'-DDT	789-02-6		41.3%	18.09%	
p,p'-DDT	50-29-3		42.7%	25.23%	31.94%
p,p'-DDD	72-54-8		38.6%	23.56%	12.17%
p,p'-DDE	72-55-9		17.0%	17.43%	16.25%
chlordan	57-74-9				
α-chlordan	5103-71-9			23.07%	12.22%
γ-chlordan	5103-74-2			9.91%	12.63%
nonachlor	3734-49-4				
trans-nonachlor	39765-80-5				22.47%
endrin	70-20-8			8.93%	
HCB	118-74-1		10.4%	11.98%	17.86%
heptachlor epoxide	1024-57-3		19.1%	5.54%	
methoxychlor	72-43-5			10.66%	
dieldrin	60-57-1		17.8%	10.42%	12.09%
heptachlor	76-44-8		18.9%	15.22%	
endosulfan I (a)	959-98-7		32.9%	8.85%	
endosulfan II (b)	33213-65-9		30.2%	11.07%	

TABLE G-6. ANALYTICAL PRECISION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	NLET ^C	IU
PAHs		±50-100%	±10-20%		n=19
benzo[a]pyrene	50-32-8		±10-20%		17.62%
acenaphthene	83-32-9				46.82%
acenaphthylene	208-96-8				36.61%
anthracene	120-12-7				21.06%
benzo[a]anthracene	56-55-3				13.03%
benzo[b]fluoranthene	205-99-2				19.20%
benzo[k]fluoranthene	207-08-9				23.47%
benzo[g,h,i]perylene	191-24-2				18.46%
benzo(e)pyrene	192-97-2				18.73%
chrysene	218-01-9				18.73%
dibenz[a,h]anthracene	53-70-3				21.60%
fluoranthene	206-44-0				20.20%
fluorene	86-73-7				27.16%
indeno[1,2,3-c,d]pyrene	193-39-5				19.65%
phenanthrene	85-01-8				20.49%
pyrene	129-00-0				25.89%
retene	483-65-8				21.89%
coronene	191-07-1				32.78%

^a Analytical precision is defined in Section 3.2 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Based on January 2000 Workshop.

^c NLET precision based on spiked DCM. Data for PCB method spikes will be developed in 2002.

Table G-7. Overall precision for precipitation organics concentration measurements^a

TABLE G-7. OVERALL PRECISION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS ^A					
PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	NLET	IU ^C
Precipitation Organics		±50-100%	N/A		
PCB Congeners		±50-100%			n=10-24
Total PCBs					38.939%
Congener # PCB 5/8	16605-91-7/34883-43-7				51.517%
Congener # PCB 16	38444-78-9				38.438%
Congener # PCB 17/15	37680-66-3/2050-68-2				49.457%
Congener # PCB 18	37680-65-2				36.973%
Congener # PCB 22	38444-85-8				38.785%
Congener # PCB 28	7012-37-5				62.397%
Congener # PCB 31	16606-02-3				57.056%
Congener # PCB 32	38444-77-8				71.575%
Congener # PCB 33	38444-86-9				37.722%
Congener # PCB 44	41464-39-5				40.743%
Congener # PCB 66	32598-10-0				32.133%
Congener # PCB 70/76	32598-11-1/70362-48-0				34.918%
Congener # PCB 95	38379-99-6				30.482%
Congener # PCB 101	37680-73-2				24.370%
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1				31.705%
Congener # PCB 123/149	65510-44-3/38380-04-0				32.742%
Pesticides		±50-100%			n=9-21
α-HCH	319-84-6				60.43%
β-HCH	58-89-9				79.42%
DDT (+ metabolites)					
p,p'-DDT	50-29-3				68.00%
o,p'-DDD	53-19-0				
p,p'-DDD	72-54-8				84.50%
p,p'-DDE	72-55-9				47.55%
chlordan	57-74-9				
α-chlordan	5103-71-9				60.19%
γ-chlordan	5103-74-2				79.33%
nonachlor	3734-49-4				
trans-nonachlor	39765-80-5				80.50%
endrin	70-20-8				
HCB	118-74-1				37.37%
heptachlor epoxide	1024-57-3				
methoxychlor	72-43-5				
dieldrin	60-57-1				41.25%
PAHs		±50-100%			n=6-17
indene				205%	
tetrahydronaphthalene				15%	
2-methylnaphthalene				17%	
1-methylnaphthalene				15%	
β-chloronaphthalene				16%	
benzo[a]pyrene	50-32-8			29%	41.31%
acenaphthene	83-32-9			15%	
acenaphthylene	208-96-8			17%	
anthracene	120-12-7				
benzo[a]anthracene	56-55-3				33.20%

TABLE G-7. OVERALL PRECISION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE ^B	OME	NLET	IU ^C
benzo[b]fluoranthene	205-99-2			32%	26.72%
benzo[k]fluoranthene	207-08-9			27%	33.54%
benzo[g,h,i]perylene	191-24-2			38%	29.58%
benzo(e)pyrene	192-97-2				28.06%
chrysene	218-01-9				32.27%
dibenz[a,h]anthracene	53-70-3				27.97%
fluoranthene	206-44-0			52%	35.37%
fluorene	86-73-7			24%	25.86%
indeno[1,2,3-c,d]pyrene	193-39-5			41%	32.40%
phenanthrene	85-01-8			34%	43.16%
pyrene	129-00-0			76%	39.16%
retene	483-65-8				46.75%
coronene	191-07-1				40.36%

^a Overall precision, determined from collocated samplers, is defined in Section 3.2 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Based on the January 2000 Workshop.

^c RPD between two duplicates were calculated according to equation 3-6. Average RPDs over two years of data are provided. Zero values were excluded. N is listed within the table.

^d <100% of values <5 X LOD; <50% if values >5 X LOD.

N/A Not Available as of this revision of the QAPP.

Table G-8. Limits of detection for precipitation organics concentration measurements^a

TABLE G-8. LIMITS OF DETECTION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS ^A						
PARAMETER	CAS NUMBER	WORKING OBJECTIVE	MOE ^C	NWRI ^D	NLET ^E	IU ^F
Precipitation Organics			ng/L	All values in pg		ng/L
PCBs		0.06 ng/L/0.005 ng/L				n=21
Total PCBs						2.14597
Congener # PCB 1	2051-60-7			n/a		
Congener # PCB 3	2051-62-9			0.2		
Congener # PCB 4/10	13029-08-8/33146-45-1			0.06		0.15576
Congener # PCB 5	16605-91-7		0.0859			
Congener # PCB 5/8	16605-91-7/34883-43-7			0.04		0.13800
Congener # PCB 6	25569-80-6		0.110	0.05		0.02096
Congener # PCB 7	33284-50-3			n/a		
Congener # PCB 7/9	33284-50-3/34883-39-1					0.02366
Congener # PCB 8	34883-43-7		0.0904			
Congener # PCB 12	2974-92-7					0.00447
Congener # PCB 12/13	2974-92-7/3974-90-5			0.07		
Congener # PCB 13	2974-90-5					
Congener # PCB 15	2050-68-2		0.618	0.03	n/a	
Congener # PCB 15/17	2050-68-2/37680-66-3					0.05598
Congener # PCB 16	38444-78-9		0.110	0.03		0.03417
Congener # PCB 16/32	38444-78-9/39444-77-8			-		
Congener # PCB 17	37680-66-3		0.0488	0.02		
Congener # PCB 18	37680-65-2		0.0581	0.02		0.05693
Congener # PCB 19	38444-73-4			0.19		0.00680
Congener # PCB 21	55702-46-0		0.0992	n/a		
Congener # PCB 22	38444-85-8		0.0577	0.02		0.07544
Congener # PCB 22/51	38444-85-8/68194-04-7			-		
Congener # PCB 24	55702-45-9					0.01573
Congener # PCB 24/27	55702-45-9/38444-76-7			0.03		
Congener # PCB 25	55712-37-3			0.03		0.02197
Congener # PCB 26	38444-81-4			0.03		0.00670
Congener # PCB 27	38444-76-7					0.00733
Congener # PCB 28	7012-37-5		0.0716	0.02		0.08141
Congener # PCB 28/31	7012-37-5/16606-02-3			-		
Congener # PCB 29	15862-07-4			0.03		0.01315
Congener # PCB 31	16606-02-3		0.0965	0.03	n/a	0.08539
Congener # PCB 32	39444-77-8			0.02		0.00977
Congener # PCB 33	38444-86-9		0.0708	0.02		0.09466
Congener # PCB 37	38444-90-5		0.185			0.03821
Congener # PCB 37/42	38444-90-5/36559-22-5			n/a		
Congener # PCB 40	38444-93-8			0.02	n/a	0.00430
Congener # PCB 41	52663-59-9		0.0582			
Congener # PCB 41/64/71	52663-59-9/52663-58-8/41464-46-4			0.01		
Congener # PCB 41/71	52663-59-9/41464-46-4					0.18778
Congener # PCB 42	36559-22-5		0.0305			0.01047
Congener # PCB 42/59	36559-22-5/74472-33-6			0.02		
Congener # PCB 43	70362-46-8			n/a		0.00298
Congener # PCB 44	41464-39-5		0.092	0.02	n/a	0.32591
Congener # PCB 45	70362-45-7			0.02		0.00368
Congener # PCB 46	41464-47-5			0.02		0.01182
Congener # PCB 47	2437-79-8		0.0839	0.04		0.00398
Congener # PCB 47/48	2437-79-8/70362-47-9			-		
Congener # PCB 48	70362-47-9			0.02		0.00909

TABLE G-8. LIMITS OF DETECTION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE	MOE ^C	NWRI ^D	NLET ^E	IU ^F
Congener # PCB 49	41464-40-8		0.0809	0.02	n/a	0.09552
Congener # PCB 52	35693-99-3		0.0835	0.02	n/a	0.07399
Congener # PCB 53	41464-41-9		0.0711	0.03		0.01452
Congener # PCB 54	15968-05-5			0.03		
Congener # PCB 56	41464-43-1		0.121			
Congener # PCB 56/60	41464-43-1/33025-41-1			0.02	n/a	0.03238
Congener # PCB 63	74472-34-7			0.02		
Congener # PCB 64	52663-58-8					0.01701
Congener # PCB 66	32598-10-0		0.0886	0.03		0.04904
Congener # PCB 70	32598-11-1		0.0768	0.023		
Congener # PCB 70/76	32598-11-1/70362-48-0			-		0.03776
Congener # PCB 74	32690-93-0		0.153	0.02		0.01830
Congener # PCB 76	70362-48-0		0.0569			
Congener # PCB 77	32598-13-3		0.121	0.01	n/a	0.00351
Congener # PCB 81	70362-50-4		0.0942			0.01710
Congener # PCB 81/87	70362-50-4/38380-02-8			0.02		
Congener # PCB 82	52663-62-4			0.01		0.01571
Congener # PCB 83	60145-20-2			0.02		0.00679
Congener # PCB 84	52663-60-2		0.272	0.01		
Congener # PCB 84/92	52663-60-2/52663-61-3			-		0.05607
Congener # PCB 85	65510-45-4			0.01		0.01448
Congener # PCB 87	38380-02-8		0.0948	-	n/a	0.03351
Congener # PCB 89	73575-57-2			0.01		0.00272
Congener # PCB 91	68194-05-8			0.02		0.01222
Congener # PCB 91/121	68194-05-8/56558-18-0			-		
Congener # PCB 92	52663-61-3		0.244			
Congener # PCB 95	38379-99-6		0.0693	0.01		0.06527
Congener # PCB 97	41464-51-1		0.0470	0.02		0.01564
Congener # PCB 99	38380-01-7		0.0838	0.02		0.02123
Congener # PCB 100	39485-83-1			0.03		0.04433
Congener # PCB 101	37680-73-2		0.0602	0.02	n/a	0.06530
Congener # PCB 105	32598-14-4		0.0974			
Congener # PCB 105/132	32598-14-4/38380-05-1			-	n/a	0.05098
Congener # PCB 105/132/153	32598-14-4/38380-05-1/ 35065-27-1			-		
Congener # PCB 107	70424-68-9					0.00543
Congener # PCB 107/144	70424-68-9/68194-14-9			0.02		
Congener # PCB 110	38380-03-9		0.0598	0.03		0.06808
Congener # PCB 114	74472-37-0		0.0806			
Congener # PCB 114/131	74472-37-0/61798-70-7					0.00430
Congener # PCB 118	31508-00-6		0.0712	0.02		0.03874
Congener # PCB 118/149	31508-00-6/38380-04-0			n/a	n/a	
Congener # PCB 119	56558-17-9		0.0636	0.02		0.00265
Congener # PCB 123/149	65510-44-3/38380-04-0					0.03901
Congener # PCB 126	57465-28-8		0.166			
Congener # PCB 128	38380-07-3			0.02		0.00436
Congener # PCB 129	5521-18-4			0.01		0.00057
Congener # PCB 130	52663-66-8					0.07306
Congener # PCB 131	61798-70-7			0.01		
Congener # PCB 132	38380-05-1		0.0762	0.01		
Congener # PCB 134	52704-70-8					0.00530
Congener # PCB 135	52744-13-5			0.03		
Congener # PCB 135/144	52744-13-5/68194-14-9			-		0.87921
Congener # PCB 136	38411-22-2			0.110	0.01	0.01561
Congener # PCB 137	35694-06-5			0.01		
Congener # PCB 137/176	35694-06-5/52663-65-7			-		

TABLE G-8. LIMITS OF DETECTION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE	MOE ^C	NWRI ^D	NLET ^E	IU ^F
Congener # PCB 138	35065-28-2		0.151			
Congener # PCB 138/163	35065-28-2/74472-44-9		0.02		0.04550	
Congener # PCB 141	52712-04-6		0.02		0.04871	
Congener # PCB 144	68194-14-9		0.01			
Congener # PCB 146	51908-16-8		0.01		0.01245	
Congener # PCB 149	38380-04-0		0.0749	0.02		
Congener # PCB 151	52663-63-5		0.02		0.01290	
Congener # PCB 153	35065-27-1		0.0625	0.01	n/a	
Congener # PCB 156	38380-08-4		0.0758		0.00693	
Congener # PCB 156/171/202	38380-08-4/52663-71-5/2136-99-4		0.3		n/a	
Congener # PCB 157	69782-90-7					
Congener # PCB 157/200	69782-90-7/52663-73-7		-		0.01763	
Congener # PCB 158	74472-42-7		0.01		0.00373	
Congener # PCB 167	52663-72-6		0.01		0.0060	
Congener # PCB 169	32774-16-6		0.0980	0.02		
Congener # PCB 170	35065-30-6		0.01			
Congener # PCB 170/190	35065-30-6/41411-64-7				0.00926	
Congener # PCB 171	52663-71-5		0.01			
Congener # PCB 171/202	52663-71-5/2136-99-4				0.00117	
Congener # PCB 172	52663-74-8		0.01		0.03776	
Congener # PCB 173	68194-16-1		0.0563		0.02525	
Congener # PCB 174	38411-25-5		0.01		0.03451	
Congener # PCB 175	40186-70-7		0.01		0.00713	
Congener # PCB 176	52663-65-7		0.01			
Congener # PCB 177	52663-70-4		0.01		0.00157	
Congener # PCB 178	52663-67-9		0.01		0.01256	
Congener # PCB 180	35065-29-3		0.0961	0.01	n/a	0.01103
Congener # PCB 182/187	60145-23-5/52663-68-0		0.01		0.00522	
Congener # PCB 183	52663-69-1		0.01		0.00512	
Congener # PCB 185	52712-05-7		0.01		0.00197	
Congener # PCB 189	39635-31-9		0.01		0.01121	
Congener # PCB 190	41411-64-7		0.01			
Congener # PCB 191	74472-50-7		0.0415	0.01	0.00908	
Congener # PCB 193	69782-91-8			0.01	0.08015	
Congener # PCB 194	35694-08-7		0.187	0.01	0.00243	
Congener # PCB 195	52663-78-2		0.0655	0.01		
Congener # PCB 195/208	52663-78-2/52663-77-1		-		0.00129	
Congener # PCB 196/203	42740-50-1/52663-76-0			0.01		
Congener # PCB 197	33091-17-7			0.01	0.00517	
Congener # PCB 198	68194-17-2			0.01	0.98221	
Congener # PCB 199	52663-73-7			0.01		
Congener # PCB 200	40186-71-8			0.01		
Congener # PCB 201	52663-75-9			0.01	0.02446	
Congener # PCB 203	52663-76-0				0.00521	
Congener # PCB 205	74472-53-0		0.0672	0.01	0.00956	
Congener # PCB 206	40186-72-9		0.103	0.01		
Congener # PCB 207	52663-79-3			0.02	0.00303	
Congener # PCB 208	52663-77-1			0.01		
Congener # PCB 209	2051-24-3				0.00696	
Pesticides		0.15 ng/L/0.1 ng/L			n=22	
α-HCH	319-84-6		0.285	0.2	0.4 pg	0.0892
β-HCH	319-85-7		0.297	0.3		
γ-HCH	58-89-9		0.221	0.2	0.4 pg	0.0431
DDT (+ metabolites)					0.4 pg	
p,p'-DDT	50-29-3		0.316	0.03	0.4 pg	0.5630

TABLE G-8. LIMITS OF DETECTION FOR PRECIPITATION ORGANICS CONCENTRATION MEASUREMENTS^A

PARAMETER	CAS NUMBER	WORKING OBJECTIVE	MOE ^C	NWRI ^D	NLET ^E	IU ^F
o,p'-DDT	784-02-6		0.615			
o,p'-DDD	53-19-0			0.03	0.4 pg	
p,p'-DDD	72-54-8		0.215	0.01	0.4 pg	0.2325
p,p'-DDE	72-55-9		0.252	0.03	0.4 pg	0.04285
chlordan	57-74-9		-		0.4 pg	
α -chlordan	5103-71-9		0.286	0.06		0.3515
γ -chlordan	5103-74-2		0.251	0.06		0.0795
nonachlor	3734-49-4			n/a		
trans-nonachlor	39765-80-5			n/a		0.0572
endrin	70-20-8			0.01	0.4 pg	
HCB	118-74-1		0.115	0.1	0.4 pg	0.00854
heptachlor epoxide	1024-57-3		0.287	0.3	0.4 pg	
methoxychlor	72-43-5		0.242	0.3	0.4 pg	
dieldrin	60-57-1		0.136	0.2	0.4 pg	0.0502
heptachlor	76-44-8		0.287	0.2		
endosulfan I (a)	959-98-8		0.293	0.1		
endosulfan II (b)	33213-65-9		0.506	0.5		
aldrin	309-00-2		0.135	0.3		
mirex	2385-85-5		0.288	0.3		
PAHs		0.15 ng/L/0.1 ng/L				n=21
benzo[a]pyrene	50-32-8		1.0		30 pg	0.4792
acenaphthene	83-32-9			1.1		
acenaphthylene	208-96-8			2.26		
anthracene	120-12-7			1		0.4288
benzo[a]anthracene	56-55-3		2.0			0.3528
benzo[b]fluoranthene	205-99-2		2.0			0.6487
benzo[k]fluoranthene	207-08-9		2.0			0.2986
benzo[g,h,i]perylene	191-24-2		2.0	10		
benzo(e)pyrene	192-97-2					0.3070
chrysene	218-01-9		2.0			0.8679
dibenz[a,h]anthracene	53-70-3		2.0	1.62		
fluoranthene	206-44-0		2.0			1.0889
fluorene	86-73-7					0.3180
indeno[1,2,3-c,d]pyrene	193-39-5		2.0			
phenanthrene	85-01-8		5.0	9.5		2.1614
pyrene	129-00-0		2.0			0.513
retene	483-65-8		n/a			0.4488
coronene	191-07-1		n/a			

^A Limits of detection are defined in Section 3.3 of this appendix. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^B Based on the January 2000 Workshop.

^C The values listed for OME is the Method Detection Limit (MDL) divided by a presumed sample volume of 10 litres (see section 3.3.2).

^D Detection limit is the IDL as per equation 3-10, with a 95% confidence level.

^E Detection limits are based on an average sample volume of 10 litres and calculated using equation 3-13.

Table G-9. Analytical recoveries for air and precipitation trace metal concentration measurements

TABLE G-9. ANALYTICAL RECOVERIES FOR AIR AND PRECIPITATION TRACE METAL CONCENTRATION MEASUREMENTS					
PARAMETER	WORKING OBJECTIVE ^B	OME ^C	MSC ^D		EHD (NLET)
Air Metals			Matrix Spikes		
Pb	±10%	n/a	103.6%	99.9%	n/a
As		n/a	n/a	n/a	n/a
Se		n/a	n/a	n/a	n/a
Cd		n/a	102.1%	100.3%	n/a
Al		n/a	105.5%	95.9%	
Cr			101.1%	100.9%	
Cu			107.8%	101.3%	
Zn		n/a	97.2%	99.5%	
Hg		n/a	n/a	n/a	n/a
Other Air Parameters					
TOC	±20%		80-120%		n/a
TSP	±20%		<10%		n/a
PM-10	±20%				
Precipitation Metals		Matrix Spikes	CRM		
Pb	<10%	105.2%	96.3%	n/a	96.4%
As			99.1%	n/a	n/a
Se		n/a	n/a	n/a	n/a
Cd		105.4%	98.4%	n/a	97.6%
Al		108.1%	102.0%		99%
Zn		91.8%	100.1%		95.5%
Hg		n/a	n/a		

^a Accuracy is defined in Section 3.1 of this appendix. Accuracy numbers for air metals, other air parameters, and precipitation metals are for analytical accuracy. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Based on the January 2000 Workshop.

^c For OME: Precipitation Spikes, n=10; aqueous CRMs, n=4 to 7.

^d Mean recovery values for ICP analysis, calculated using equation 3-2. For matrix spikes, n=30. For the CRM, n=10.

n/a Not applicable.

Table G-10. Analytical precision for air and precipitation trace metal concentration measurements^a

TABLE G-10. ANALYTICAL PRECISION FOR AIR AND PRECIPITATION TRACE METAL CONCENTRATION MEASUREMENTS ^A					
PARAMETER	WORKING OBJECTIVE ^B	OME ^C	MSC ^D		EHD (NLET)
AIR METALS			MATRIX SPIKES	CRM	
Pb	±15%	9.8%	3.57%	3.75%	n/a
As		N/A	n/a	n/a	n/a
Se		n/a	n/a	n/a	n/a
Cd		N/A	3.74%	1.83%	n/a
Al		11.2%	5.47%	3.03%	n/a
Cr		N/A	5.18%	1.29%	
Cu		9.9%	3.71%	2.16%	
Zn		14.3%	7.81%	2.76%	n/a
Hg		n/a	n/a	n/a	n/a
Other Air Parameters					
TSP	±20%	n/a	±10%		n/a
TOC	±20%	n/a	±15%		n/a
PM-10	±20%	n/a			n/a
Precipitation Metals					
Pb	±10%	14.95%	n/a		±6.1
As		42.0%	n/a		n/a
Se		n/a	n/a		n/a
Cd		27.9%	n/a		±4.9
Al		2.99%	n/a		±5.3
Cr		15.4%	n/a		±6.6
Zn		N/A	n/a		±4.8
Hg		n/a	n/a		n/a

^a Precision is defined in Section 3.2 of this appendix. Precision numbers for air metals, other air parameters, and precipitation metals are for analytical precision. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Based on January 2000 Workshop.

^c OME precision values are based on within-run analysis of duplicate samples. For Air Filters, n=95. For Precipitation samples, n=158.

^d Mean %RSD for ICP analysis, calculated using equation 3-3. For matrix spikes, n=30. For the CRM, n=10.

n/a Not applicable.

Table G-11. Overall precision for air and precipitation trace metal concentration measurements^a

TABLE G-11. OVERALL PRECISION FOR AIR AND PRECIPITATION TRACE METAL CONCENTRATION MEASUREMENTS ^A				
PARAMETER	WORKING OBJECTIVE ^B	OME ^C	MSC	EHD (NLET)
Air Metals				
Pb	$\pm 20\%$	$\pm 20\%$		n/a
As		$\pm 20\%$		n/a
Se		n/a		n/a
Cd		$\pm 20\%$		n/a
Al		$\pm 20\%$		n/a
Zn		$\pm 20\%$		n/a
Hg		n/a	N/A	n/a
Other Air Parameters				
TSP	$\pm 20\%$		$\pm 15\%$	n/a
TOC	$\pm 20\%$		$\pm 20\%$	n/a
PM-10	$\pm 20\%$			n/a
Precipitation Metals				
Pb	$\pm 15\%$	$\pm 15\%$	n/a	n/a
As		$\pm 10\%$	n/a	
Se		n/a	n/a	
Cd		$\pm 10\%$	n/a	
Al		$\pm 10\%$		
Zn		$\pm 10\%$		
Hg		n/a	n/a	n/a

^a Precision is defined in Section 3.2 of this appendix. Precision numbers for air metals, other air parameters, and precipitation metals are for overall precision. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range.

^b Based on the January 2000 Workshop.

^c OME overall precision is a target value. Some stations may have greater acceptable range of precision because of season, remoteness of location, or other factors.

n/a Not applicable.

Table G-12. Limits of detection for air and precipitation trace metal concentration measurements^a

PARAMETER	WORKING OBJECTIVE ^B	OME ^C	MSC		EHD (NLET)
Air Metals			ICP ^d	NAA ^e	
Pb	1 ng/m ³	0.03 ng/m ³	1.98 ng/m ³	N/A	n/a
As	0.012 ng/m ³ / 0.1 ng/m ³	0.13 ng/m ³	N/A	0.13 ng/m ³	n/a
Se	0.1 ng/m ³	n/a	N/A	0.39 ng/m ³	n/a
Cd	0.24 ng/m ³ / 0.1 ng/m ³	0.06 ng/m ³	0.27 ng/m ³	N/A	n/a
Al		0.06 ng/m ³	23.76 ng/m ³	53.85 ng/m ³	n/a
Cr		0.13 ng/m ³	1.27 ng/m ³	5.41 ng/m ³	n/a
Cu		0.13 ng/m ³	2.28 ng/m ³	21.60 ng/m ³	n/a
Zn		0.13 ng/m ³	20.52 ng/m ³	2.70 ng/m ³	n/a
Hg		n/a	N/A	N/A	n/a
Other Air Parameters					
TSP					n/a
TOC					n/a
PM-10					n/a
Precipitation Metals					
Pb	0.1 ng/L	0.02 µg/L	n/a		0.5 µg/L
As		0.1 µg/L	n/a		n/a
Se		n/a	n/a		n/a
Cd		0.05 µg/L	n/a		0.1 µg/L
Al		0.05 µg/L	n/a		2 µg/L
Cr		0.1 µg/L			0.2 µg/L
Cu		0.1 µg/L			0.2 µg/L
Zn		0.1 µg/L	n/a		0.2 µg/L
Hg		n/a	n/a		n/a
Sample Volume					
Air	n/a	n/a			
Precipitation	0.02 cm	0.02 cm	n/a	n/a	0.05 cm

^a Limits of detection are defined in Section 3.3 of this appendix.

^b Based on the January 2000 Workshop.

^c OME Air LOD's are based on an average air volume of 80 m³.

^d ICP analysis performed on one strip of the filter after a water extraction. LOD is based on a presumed sample volume of 1600 m³. ICP analysis for Aluminum has a systematic bias of 50% of the NAA results.

^e NAA analysis performed on a second strip of the filter. LOD is based on a presumed sample volume of 1600 m³.

n/a Not applicable.

Table G-13. Accuracy for general field measurements and meteorological measurements^a

PARAMETER	WORKING OBJECTIVE ^b	OME ^c	MSC	EHD	IU ^d
Sample Volume					
Air	<10%/<20%	<10%		n/a	<10%
Precipitation	<10%	<10%			<10%
Meteorology					
Temperature	<0.5%		0.5°C	n/a	±0.5°C
Relative Humidity	<20%		5%	n/a	±5%
Wind Speed	<5%		1 m/s	n/a	±5%
Wind Direction	<5°		<±5°	n/a	±10%
Precipitation Amount	<5%		0.1 mm	n/a	<5%
Barometric Pressure	<0.5%		0.1 lba	n/a	n/a
Solar Irradiation	<5%		10 µs/m ²	n/a	±5%

^a Accuracy is defined in Section 3.1 of this appendix. Accuracy numbers for meteorological parameters are based on the use of collocated transfer standards or factory calibration.

^b Based on the January 2000 Workshop.

^c OME obtains meteorological data from MSC.

^d Factory calibration

n/a Not applicable.

Table G-14. Precision for general field measurements and meteorological measurements^a

PARAMETER	WORKING OBJECTIVE ^b	OME ^c	MSC	EHD	IU ^d
SAMPLE VOLUME					
Air	±10%	±10%		n/a	±10%
Precipitation	±10%	±10%			±10%
Meteorology					
Temperature	±5%		0.5°C	n/a	±5%
Relative Humidity	±20%		±10%	n/a	±20%
Wind Speed	±10%		±10%	n/a	±10%
Wind Direction	±10°		±10%	n/a	±10%
Precipitation Amount	±10%		±10%	n/a	±10%
Barometric Pressure	±5%		0.1%	n/a	n/a
Solar Irradiation	±10%		±10%	n/a	±10%

^a Precision is defined in Section 3.2 of this appendix. Precision numbers for air metals, other air parameters, and precipitation metals are for analytical precision. Numbers given for specific agencies may be compound specific values or represent the range of typical values depending on the compound and/or concentration range. Precision numbers for meteorological parameters are based on the use of collocated transfer standards or factory calibration.

^b Based on the January 2000 Workshop.

^c OME obtains meteorological data from MSC.

^d RSD of collection volumes for 1996 samples from 3 Master Stations.

n/a Not applicable.

Table G-15. Overall precision for general field measurements and meteorological measurements^a

TABLE G-15. OVERALL PRECISION FOR GENERAL FIELD MEASUREMENTS AND METEOROLOGICAL MEASUREMENTS ^A					
PARAMETER	WORKING OBJECTIVE ^B	OME ^C	MSC	EHD	IU
Sample Volume					
Air	±10%	±10%		n/a	±10%
		±10%, 0.02 cm			±10%
Meteorology					
Temperature	±5%, 0.5°C		0.5°C	n/a	±5%,
Relative Humidity	±20%		±5%,	n/a	±20%
Wind Speed	±10%		±10%	n/a	±10%
Wind Direction	±10 °C		±10%	n/a	±10%
Precipitation Amount	±10%		±10%	n/a	±10%
Barometric Pressure	±5%,		±0.1%	n/a	n/a
Solar Irradiation	±10%		10%	n/a	±10%

^a Precision is defined in Section 3.2 of this appendix. Precision numbers for meteorological parameters are based on the use of collocated transfer standards or factory calibration.

^b Based on the January 2000 Workshop.

^c OME obtains meteorological data from MSC.

n/a Not applicable.

Table G-16. Completeness^a goals for air and precipitation trace metal concentration measurements, general field measurements, and meteorological measurements^a

TABLE G-16. COMPLETENESS^A GOALS FOR AIR AND PRECIPITATION TRACE METAL CONCENTRATION MEASUREMENTS, GENERAL FIELD MEASUREMENTS AND METEOROLOGICAL MEASUREMENTS^A					
PARAMETER	WORKING OBJECTIVE ^B	OME ^C	MSC	EHD	IU
Air Metals	>80%/60% / >75%/66%	75%/66%	>80%/66%	n/a	75%/66%
Pb	>80%/60% / >75%/66%	"		n/a	75%/66%
As	>80%/60% / >75%/66%	"		n/a	75%/66%
Se	>80%/60% / >75%/66%	"		n/a	75%/66%
Cd	>80%/60% / >75%/66%	"		n/a	75%/66%
Hg		n/a		n/a	n/a
Other Air Parameters					
TSP	>75%/66%			n/a	75%/66%
TOC	>75%/66%			n/a	75%/66%
PM-10	>75%/66%			n/a	75%/66%
Precipitation Metals	>80%/60% / >75%/66%	75%/66%	n/a	90%	
Pb	>80%/60% / >75%/66%	"	n/a	90%	75%/66%
As	>80%/60% / >75%/66%	"	n/a	n/a	75%/66%
Se	>80%/60% / >75%/66%	"	n/a	n/a	75%/66%
Cd	>80%/60% / >75%/66%	"	n/a	90%	75%/66%
Hg		n/a	n/a	n/a	n/a
Sample Volume					
Air	>95%/90%	>95%/90%		n/a	>95%/90%
Precipitation	>95%/90%	>95%/90%			>95%/90%
Meteorology					
Temperature	>95%/90%		95%/90%	n/a	>95%/90%
Relative Humidity	>95%/90%		95%/90%	n/a	>95%/90%
Wind Speed	>95%/90%		95%/90%	n/a	>95%/90%
Wind Direction	>95%/90%		95%/90%	n/a	>95%/90%
Precipitation Amount	>95%/90%		95%/90%	n/a	>95%/90%
Barometric Pressure	>95%/90%		95%/90%	n/a	n/a
Solar Irradiation	>95%/90%		95%/90%	n/a	>95%/90%

^a Completeness is defined in Section 3.4 of this appendix. The agreed-upon completeness goal for the IADN is 75% annually, 66% seasonally for organics and trace metals measurements. Some groups may have higher completeness goals for their own programs.

^b Based on the January 2000 Workshop..

^c OME obtains meteorological data from MSC.

n/a Not applicable.

Table G-17. Final working recommendations for DQIs for general concentration and field measurements^a

TABLE G-17. FINAL WORKING RECOMMENDATIONS FOR DQIS FOR GENERAL CONCENTRATION AND FIELD MEASUREMENTS ^a					
PARAMETER	ACCURACY ^b	ANALYTICAL PRECISION ^c	OVERALL PRECISION ^d	LOD ^e	COMPLETENESS ^f
AIR ORGANICS	50-130%	±50-100%	±50-100%	0.003 NG/M ³	>75%/66%
PCBs	50-130%	±50-100%	±50-100%	0.003 ng/m ³	>75%/66%
Pesticides	50-130%	±50-100%	±50-100%	0.003 ng/m ³	>75%/66%
PAHs	50-130%	±50-100%	±50-100%	0.003 ng/m ³	>75%/66%
Air Metals					>75%/66%
Pb	<10%	±15%	±20%	30 ng/m ³	>75%/66%
Other Air Parameters					
TOC	<20%	±20%	±20%		
TSP	<20%	±20%	±20%		
PM10	<20%	±20%	±20%		
Precipitation Organics	50-130%	±50-100%	±50-100%		>75%/66%
PCBs	50-130%	±50-100%	±50-100%	0.005 ng/L	>75%/66%
Pesticides	50-130%	±50-100%	±50-100%	0.1 ng/L	>75%/66%
PAHs	50-130%	±50-100%	±50-100%	0.1 ng/L	>75%/66%
Precipitation Metals					>75%/66%
Pb	<10%	±10%	±15%	0.1 ng/L	>75%/66%
Sample Volume	<10%	±10%	±10%		>95%/90%
Air	<10%	±10%	±10%	n/a	>95%/90%
Precipitation	<10%	±10%	±10%, 0.02 cm	0.02 cm	>95%/90%
Meteorology					>95%/90%
Temperature	<5%, 0.5°C	±5%	±5%	n/a	>95%/90%
Relative Humidity	<20%	±20%	±20%	n/a	>95%/90%
Wind Speed	<5%, 1 m/s	±10%	±10%	n/a	>95%/90%
Wind Direction	<5°	±10°	±10%	n/a	>95%/90%
Precipitation Amount	<5%	±10%	±10%	n/a	>95%/90%
Pressure	<5%	±5%	±5%	n/a	>95%/90%
Solar Irradiation	<5%	±10%	±10%	n/a	>95%/90%

^a Based on January 2000 Workshop.

^b Accuracy is defined in Section 3.1 of this appendix. Accuracy numbers for air and precipitation organics and air and precipitation metals are analytical accuracy numbers based on analytical recoveries. Accuracy numbers for TSP and PM10 are based on flow accuracy while TOC numbers are based on a combination of analytical recovery and flow accuracy. Accuracy numbers for meteorological parameters are based on either a collocated transfer standard or factory calibration.

^c Precision is defined in Section 3.2 of this appendix. Precision numbers for meteorological parameters are based on either a collocated transfer standard or factory calibration.

^d Precision is defined in Section 3.2 of this appendix. Overall precision numbers for all organics and metals in air and precipitation, as well as other air parameters, are based on the results of collocated samplers. Precision numbers for meteorological parameters are based on either a collocated transfer standard or factory calibration.

^e Limits of detection are defined in Section 3.3 of this appendix. Detection limits are based primarily on MDLs. LOD's for organics in precipitation are based on a presumed sample volume of 10 litres.

^f Completeness is defined in Section 3.4 of this appendix. Completeness is given as overall completeness for a year and season. Overall completeness is the product of field and laboratory completeness.

N/A Not applicable.

Table G-18. Summary of measures for DQI's

TABLE G-18. SUMMARY OF MEASURES FOR DQI'S			
Parameter	DQI	Measure(s)	Comments
Air Organics Concentrations	Analytical Recovery	%R(MS), %R(SRM)	Using lab matrix spike (LMS), lab surrogate spike (LSS), standard reference material (SRM)
	Flow Accuracy	%Difference	Calibration with transfer standard
	Analytical Precision	RPD(dupl.), RSD(repl.)	Using LMS, LSS - may be further defined for within/between runs
	Overall Precision	RPD(dupl.), MAD(D)	Collocated samples
	Detection Limit	IDL, MDL, LOD	Using lab blank (LB), lab matrix blank (LMB), field blank (FB), and low concentration solutions
	Overall Completeness	%VSMP = %C	By site for year, season
Precipitation Organics Concentrations	Analytical Recovery	%R(MS), %R(SRM)	Using LMS, LSS
	Analytical Precision	%Difference	Using LMS, LSS - may be further defined for within/between runs
	Overall Precision	RPD(dupl.), MAD(D)	Collocated samples
	Detection Limit	IDL, MDL, LOD	Using LB, LMB, FB, and low concentration solutions
	Overall Completeness	%VSMP = %C	By site for year, season; other measures optional
Air Metals Concentrations	Analytical Recovery	%R(MS), %R(SRM)	Using LMS, LSS
	Flow Accuracy	%Difference	Calibration with transfer standard
	Analytical Precision	RPD(dupl.), RSD(repl.)	Using LMS, split samples, repeat measurements - may be further defined for within/between runs
	Overall Precision	RPD(dupl.), MAD(D)	Not measured currently; recommend collocated samples for each site at least once per season (quarter)
	LOD	Not Specified	To be specified
	Overall Completeness	%C	By site for year, season
Other Air Parameters	Flow Accuracy	%Difference	Calibration with transfer standard
	TSP, PM10, TOC	Analytical Precision	Using LMS, split samples, repeat measurements - may be further defined for within/between runs
		Overall Precision	Not measured currently; recommend collocated samples for each site at least once per season (quarter)
	LOD	Not Specified	To be specified
	Overall Completeness	%C	By site for year, season

TABLE G-18. SUMMARY OF MEASURES FOR DQI'S

Parameter	DQI	Measure(s)	Comments
Precipitation Metals Concentrations	Analytical Recovery	%R(MS), %R(SRM)	Using LMS, LSS
	Analytical Precision	RPD(dupl.), RSD(repl.)	Using LMS, split samples, repeat measurements - may be further defined for within/between runs
	Overall Precision	RPD(dupl.), MAD(D)	Collocated samples
	LOD	Not Specified	To be specified
	Overall Completeness	%VSMP = %C	By site for year, season; other measures optional
Meteorological Parameters	Accuracy	%Difference	Using collocated transfer standard or factory calibration
T, RH, WS, WD, Precip. Amt., P	Precision	Not specified	To be specified
Solar Irradiation	Completeness	%C	By site for year, season

%C = Percent complete

%R = Analytical recovery in percent

% VSMP = Percent valid samples

FB = Field blank

IDL = Instrument detection limit

LB = Laboratory blank

LMS = Laboratory matrix spike

LOD = Limit of detection

LSS = Laboratory surrogate spike

MDL = Method detection limit

MS = Matrix spike

RPD = Relative percent difference

RSD = Relative standard deviation

SRM = Standard reference material

These terms are further defined in Section 3.0 of this appendix and the Glossary in Appendix A.